DEC 6 1921

Journal of Educational Research

OFFICIAL ORGAN OF THE NATIONAL ASSOCIATION OF DIRECTORS OF EDUCATIONAL RESEARCH

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VOL. IV NOVEMBER, 1921 No. 4

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Entered as second-class matter at the Post Office at Menasha, Wisconsin, under the act of March 3, 1879.

Journal of Educational Research

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Official Organ of the National Association of Directors of Educational Research

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But in establishing a Journal independent of any single institution, we wish to acknowledge a debt which we feel educational progress owes to the University of Illinois for its early recognition of the efforts which so many workers in educational research were ready to make in support of a journal in this field. The name of the magazine may be changed with the next volume, beginning with the January number, in order to give expression to its representative character. If our subscribers have a preference for the name, the publishers and the editor will be very glad to receive an expression of their desires.

JOURNAL *of* EDUCATIONAL RESEARCH

VOLUME IV NOVEMBER, 1921 NUMBER 4

THE CASE FOR THE LOW I. Q.

JOHN L. STENQUIST

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ILLUSTRIOUS SCHOOL FAILURES

Cases in which illustrious (not to include "merely successful") men and women were, while in school, diagnosed as failures by their teachers have often been cited. Many of the men and women, who later became world authorities in their fields, were called at best but mediocre. Linnæus' gymnasium teacher told his father that he was unfit for any profession. Yet this boy later was to revolutionize the science of botany.[1] Charles Darwin says in his autobiography that he "was considered by all his masters and by his father as a very ordinary boy, rather below the common standard of intellect." Napoleon Bonaparte in the final examination at his military school stood forty-second in his class. We may well ask with Swift, "who were the 41 above him?" Robert Fulton was called a dullard because his mind seemed filled with things outside of school. Priestly, the great chemist, had "an exceedingly imperfect education." Pasteur "was not at all remarkable at school. Books and study had little attraction for him." M. Pierre Curie, late professor of physics at the University of Paris with his wife co-discoverer of radium, "was so stupid in school that his parents removed him and placed him under a private tutor." Such a list as this could, if space permitted, be continued to great length. Many men who today are national or world figures, but who had a poor school record, could be cited.

Granting that these cases constitute but a minority—and granting also a certain tendency to exaggeration by biographers who love contrasts—these cases are still too numerous and important to be ignored. The fundamental fact remains that the

[1] Citations are from Swift: *Mind in the making*, chapter 1.

abilities of many pupils are widely misjudged in school, and abilities are either unperceived or misunderstood because of arrested development, poorly suited courses, stereotyped curricula, or general lack of sufficiently broad means for estimating ability.

No claim is here made that *all* so-called low I. Q.'s are misjudged—only that *many* are.

The Large Percent of Low Intelligence

That a great majority of pupils who enter the first grade drop out even before the end of the first year of high school is well known. Strayer's study of 318 cities quoted by Terman shows that of those who enter the first grade, on the average only 37 percent enter the first year of high school, 25 percent the second year of high school, 17 percent the third year, and 14 percent the fourth year. Studies by Ayres and Thorndike also show the same general tendency. Terman says "It is not uncommon for one-third to drop out without finishing the first year of high school." Retardation and elimination figures from every city annually offer additional testimony of the same general facts in elementary as well as in high schools. Terman believes that "not all of this elimination is traceable to inferior mental ability, but that a large part is due to this cause there is no longer room for doubt." With this general statement all will, of course, agree. The question, however, of just how much is due to actual lack of intelligence in its broadest sense, we do not know. Terman presents much evidence to show that with the use of general intelligence tests pupils who have low intelligence and who will drop out can be largely discovered beforehand.

But a situation in which over 80 percent of the pupil population is eliminated before reaching the goal is not greatly helped by the statement that most of the pupils who thus are eliminated haven't the general intelligence to proceed further. Is it not rather an indictment both of the curricula, *and* of the tests (which select too much on identical bases)? Terman suggests the query, "Are high school standards too high?" We might also ask are they too narrow? Or, in general, too far removed from the kinds of mental capacities of pupils? If such great numbers of the school population haven't the kind of ability we call general intelligence, why call it general?

What Is General Intelligence?

Certain it is that the term general intelligence is sorely in need of definition, for by the average person, and even by a large number of specialists in educational measurement, it is accepted at face value to mean just what it says. But is it not a loose use of terms that permits us to use the name "general" intelligence to designate mental traits which are painstakingly limited to the literary-academic tasks of our present intelligence tests? Are we not misleading when we say that he, and (in effect) *only* he has general intelligence, who, with paper and pencil, can effectively do such things as, solve simple problems in arithmetic, state the opposite for each of a list of words, insert a number of deleted words in sentences, arrange words in certain logical relationships, decide whether a given number or word is identical with another, write the seventh letter of the alphabet, arrange a jumble of words to form meaningful sentences, make a cross that "shall be in the circle but not in the triangle or square," state which day comes before Sunday, write whether a sentinel should be trustworthy, indicate whether alliteration is a form of pentameter, show whether cessation of belligerency is ever desirable, declare "what one should do if it is raining when we start to school," repeat "we are having a fine time. We found a little mouse in the trap," repeat "3–1–7–5–9," give the greatest possible number of words in one minute which rhyme with "day," or any combination of such tasks that may occupy the 30 to 45 minutes given to an average present day intelligence test!

What sort of mentality has the individual who makes a low score in such tasks but who when he drops out of school has the ability to organize a gang that is all but undissolvable? Or who drops out of school and builds up a world-wide business on the identical ground where "brighter" men have failed? Or who can wrest from a Robinson Crusoe situation a triumphant career? Or even he who can start a balking automobile abandoned by "superior" persons—men of higher I. Q.'s? Or what shall we say for the lamented low intelligence of the New York boy who escaped from an institution for mental defectives and who before the authorities recaptured him had obtained and was holding a job paying him $37 per week as a foreman in a blacksmith shop?

To say that there are but few such cases is untrue. Even through the illustrious cases do constitute but a minority, who

shall estimate how many more of that large percent who drop out of school because it is unsuited to their needs would develop careers of marked usefulness, if their real abilities were discovered and trained?

To say that such persons as those cited (except, perhaps, such cases as the last mentioned) are not possessed of general intelligence is to quarrel with words. Though they may classify as "low I. Q.'s" by present-day intelligence tests, surely we are on uncertain ground if we take such results at face value and consider the cases closed.

It is a question of what our tests measure, a question of what we mean to include under the term general intelligence.

If we examine the type of criteria by which nearly all these tests are justified, we find that they consist in the last analysis essentially of teachers' estimates of pupils' ability in school, plus records in other academic tests. But our major contention is precisely that for many children the teachers' estimates and their academic record is merely an estimate of success in bookish tasks, and that here it is that fallacies of intelligence ratings creep in.

It is submitted that these intelligence tests, at best, detect only those academic qualities of pupils which are noted by teachers, and which, it is freely granted, are of great importance for success in ordinary school curricula, but which do not constitute the whole of general intelligence. Of this our abler investigators[2] are fully aware, but the average giver of tests is not aware of it; or if so, he overlooks it.

Other Kinds of Intelligence

As a matter of fact, it seems clear that intelligence may be of many kinds. Thus, for example, the campaign manager exhibits a quality differing sharply from that of the locomotive engineer; while the kind of intelligence required to lay out the construction work of a Woolworth Building is not very like that needed to write a forceful letter, and this in turn is not very like that employed in painting a great picture, or inventing a great machine such as the modern linotype.

[2] Thorndike, E. L., "Tests of intelligence, reliability, significance, etc.," *School and Society*, v. 9, February 15, 1919; Henmon, V. A. C. "Measurement of intelligence, *School and Society* v. 13, February 5, 1921.

While it may be true that a certain minimum body of "common sense" mental ability, and *some* general academic information underly all such activities, we know from at least a few correlations obtained (one of which appears later) that the relationship is not very close—though it is, to be sure, positive.

If we had trustworthy criteria of ability in social leadership and in the various political and mechanical arts and sciences, it might be possible to devise intelligence tests that would be more nearly "general" than those we now have. This, however, is a more difficult matter than to devise tests of academic ability. Again, while to measure in this wide sense the present general intelligence of our school population represents a heavy task, to prognosticate its *potential* ability would be a truly Herculean undertaking. But this is not equivalent to saying that it can't be done. Much of the same methodology and technic which we already have would apply, and progress in this direction may be looked for. Current literature is already sprinkled with discussions of the limitations of what our present so-called general intelligence tests measure.

General Intelligence and Mechanical Ability—Results of Tests

The tests of mechanical ability herein described may serve as an example and case in point, showing another type of intelligence and also emphasizing the need for clearer definition of just what we mean when we say a child has but little general intelligence.

During 1919–1920 several hundred boys in a New York City public school (P. S. 64, Manhattan) were given a very exhaustive intelligence rating by means of the combined results in the following well-known tests:[3]

A. The Intelligence Tests

National Intelligence Test A and B
Haggerty Intelligence Test, Delta 2
Otis Intelligence Test
Myers Mental Measure
Thorndike's Visual Vocabulary

[3] Stenquist, J. L., "Better Grading Through Use of Standard Mental Tests," Bureau of Reference, Research and Statistics, Board of Education, New York City.

The results of these six tests were pooled, giving equal weight to each, and the final rating was called the composite intelligence score. These boys were next given a series of mechanical tests, consisting of the following:

B. THE STENQUIST MECHANICAL TESTS

Assembling Series I: Ten unassembled commercial mechanical articles in a 5 x 2½ x 24 inch box, divided into ten compartments, to be assembled; these include a cupboard catch, an ordinary clothes pin, a three-piece paper clamp, six links of ordinary safety chain, a simple bicycle bell, a shut-off clamp (used on rubber tubing), an ordinary wire rubber stopper (such as is used on pop bottles), a push button, a simple three-piece lock, and a mouse trap.

Assembling Series II: Ten more articles like the above, consisting of a four-piece elbow catch (used on almost every cupboard door), a rope coupling, a toy pistol, an expansion nut, a window sash fastener (such as is commonly found on windows), a simple pair of calipers, an expansion four-piece rubber stopper for bottles, a four-piece paper clamp or clip, a double hinge (such as is found on every screen), and a simple lock.

Picture Test I: Consisting of 78 picture-matching problems in which the pupil is required to determine which one of five pictures belongs with, or is a part of, one key picture. The pictures treat general mechanical subjects such as mechanisms, tools, toys, machines, and their parts.

Picture Test II: This is similar to Picture Test I, but involves some language. Sixty questions are included referring to numbered parts of machine. These call for a certain type of mechanical reasoning, requiring the ability to think in terms of mechanical problems. Seventeen questions are devoted to matching pictured parts of mechanical toys.[4]

These mechanical tests inter-correlate on the average between 0.6 and 0.7 One test of actual manipulation of objects, such as Series I, correlates about as high with either of the picture

[4] Stenquist, J. L., *Measurements of Mechanical Ability.*

tests as it does with a second series of models to assemble. On the whole, any one of the four tests affords an important indication of a general ability that may for convenience be called "general mechanical aptitude"—general in the sense that it does not pertain to any special trade, and mechanical, as is more or less obvious, from its nature.

Comparison of Results

If we now compare the results in the two types of examination we may observe the following points:

As to the correlation between the Assembling Test, Series I, and the composite intelligence score, $r = 0.23 \pm 0.04$, for 267 seventh- and eighth-grade boys. Between Assembling Test, Series II, and the composite intelligence score $r = 0.34 \pm 0.06$ for 100 seventh- and eighth-grade boys. Between Picture Test II and the same intelligence rating $r = 0.34 \pm 0.03$ for 296 seventh- and eighth-grade boys.[5]

If we now combine all of the four mechanical tests into one average T-Score,[6] and correlate it with the same intelligence rating, we find r drops to 0.21 ± 0.04 for 275 seventh- and eighth-grade boys.

The important inference to draw from these results is not with regard to the exact coefficients obtained, but with regard to the general fact of low correlation between the two kinds of ability here represented. Results obtained in the army for over 14,000 men bear out the same general fact.

Figure 1, in which each dot represents an individual, shows graphically the same fact.

An individual's position in general intelligence is thus shown to be largely independent of his position in General Mechanical Ability and Aptitude.

The Trustworthiness of the Measurements

As regards the reliability of our measure of general intelligence, comprised as it is of six excellent tests, any *one* of which would

[5] The corresponding r-value for Picture Test I was computed for a presumably greater spread of talent—namely for a group including sixth-grade boys as well as those of the seventh and eighth grades. The resulting value of r (which was 0.52) is not therefore comparable with the figures given in the text.

[6] T-score is the S.D. equivalent for distribution of twelve-year-old boys, with zero considered at -5 S.D. See Wm. A. McCall *How to measure education*, "A uniform method of scale construction," *Teachers College Record*, January, 1921.

generally be accepted as a measure of general intelligence, it constitutes an unimpeachable estimate of that type of ability which we now call general intelligence. In mechanical ability we have repeated tests of each of two types of mechanical tasks—the assembling tests involving skill, and the picture tests, involving mechanical information and reasoning, i.e., we have in fact four distinct measurements of each pupil. The reliability of our measures is, therefore, acceptable, and much better than is generally obtained.

The Validity of the Measurements

The validity of a test deals with the question of what it is that it measures—i.e., with correlations with criteria.

The question of what the intelligence tests measure has already been dealt with. As to what the mechanical tests measure we may first cite the correlations which have been found in comparing mechanical test scores with pupils' ranks in shop courses and in general science courses. The following instances are cited for the Assembling Tests and shop work:

27 boys seventh and eighth grade, between test and shop rank,	$r = 0.83$
15 boys eighth grade " " " " "	$r = 0.80$
24 boys eighth grade " " " " "	$r = 0.42$
14 boys sixth and seventh grade " " " " "	$r = 0.81$
18 boys sixth grade " " " " "	$r = 0.90$
17 boys sixth grade " " " " "	$r = 0.88$

The following correlations were found for the Picture Tests and shop work:

27 seventh and eighth grade boys, between test and shop rank,	$r = 0.83$
53 high school " " " " " "	$r = 0.53$
14 sixth and seventh grade " " " " " "	$r = 0.51$
18 sixth grade " " " " " "	$r = 0.59$
17 sixth grade " " " " " "	$r = 0.59$
27 seventh and eighth grade " " " " " "	$r = 0.84$

Correlations of the same order of magnitude were found between estimates of teachers of general science and scores in the mechanical tests.

These correlations are all subject to chance errors *which reduce them.* The true correlations are therefore higher.

Shop teachers' ranks are, of course, no better than regular teachers' ranks which have been criticized in the previous section.

But there is every reason to believe them *equally good*, and the same may be said of the judgments of science teachers. Were other and better criteria available these estimates would be excluded. In several of the above instances the average rank given by two shop or science teachers (intercorrelating 0.88 or better) were used.

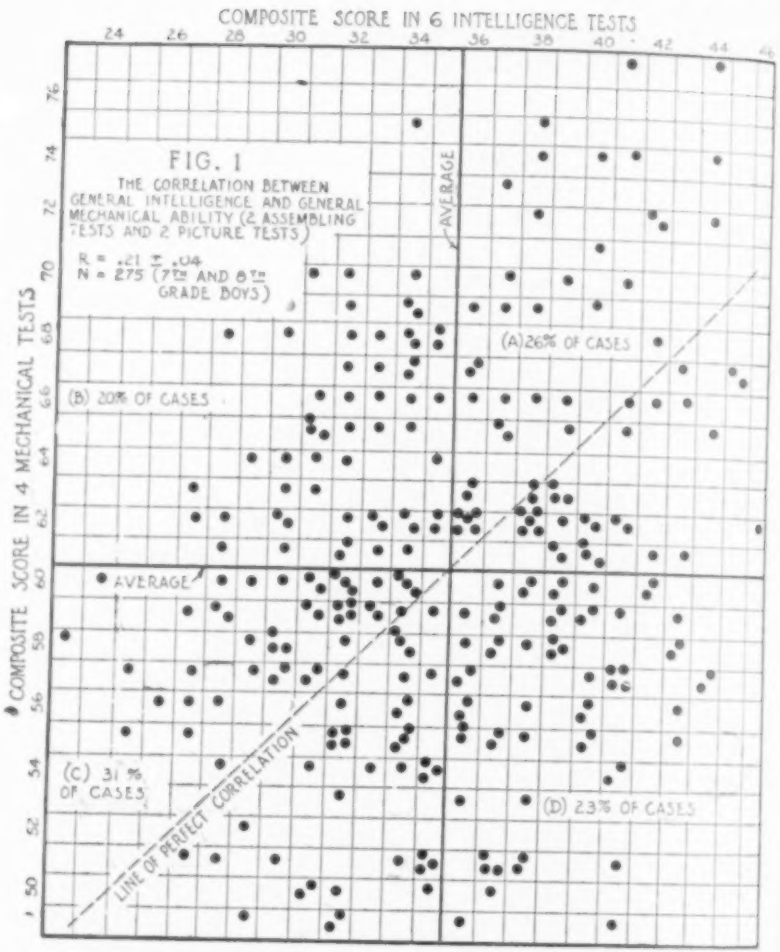
The mechanical tests may, therefore, be judged from these figures to detect to a marked degree the same qualities in pupils that are considered by shop and science teachers in judging pupils' relative abilities.

What is it that causes a pupil to stand out in this type of work? May it not be another type of intelligence that might well be called of *general* importance?

The second way of deciding what these mechanical tests measure is the very direct one of merely looking at the tests and judging what type of task it is that has been set up. Thus we may note at once that they represent an attempt (in all except Picture Test II) to get away from words. They deal with concrete and real things, as against descriptions of things. In the Assembling Tests opportunity is given to work with hands and mind, rather than to perform with a pencil only, or to juggle mental abstractions.

Analysis of Total Distribution

Figure 1 represents by dots each of 275 seventh- and eighth-grade pupils distributed according to their scores in the intelligence tests and in the mechanical tests. For convenience the figure has been divided into four quadrants each identified by a letter. The percent of the total number of pupils who fall in each quadrant is also indicated. Of the pupils in Groups B and C (all of whom are *below* average in general intelligence) two-fifths, or 20 percent of the total number, are in Group B—i.e. are *above* average ability in the mechanical tests. The pupils in groups A and B combined, or 46 percent, are above average in mechanical ability. Of these, Group A contains more than one-half (or 26 percent of the total number). These are also above average in intelligence. But for the fact that our tests show the marked ability of such pupils in mechanical ways, it is unlikely that many of Group A would be encouraged to look toward careers in mechanical fields, since they have marked abstract intelligence.



Conversely, without mechanical tests, those in Group D would not be known to be deficient in mechanical ability. Since they are above average in intelligence their general superiority might be, and no doubt often is, falsely inferred. Considering mechanical ability alone we may say that Groups A and B would likely succeed in this direction, while Groups C and D would not be likely to do so.

Again, if we were to rely merely on the intelligence tests, all pupils in Group B (one-fifth of the entire number under

consideration) would fail to be recognized as having a highly useful other ability, and as having it to a marked degree. Consider next Group C which consisted of pupils who are low in both tests. It is not without value to have this double negative of information. At least advice can be given less blindly than without such information. Again, there may be quite different types of abilities in which some of these may excel. Having them segregated we can proceed more intelligently than otherwise, to say the least. Less progress should be looked for, for one thing.

In short, the mechanical tests have given us important clues as to abilities which would not be revealed by the abstract intelligence tests alone. Though the correlation is positive it is so low as to permit wide differences in deviation. These are measures of abilities untouched by so-called general intelligence tests.

It may be thought, however, that the mixture of abilities revealed by combining the assembling and picture tests is less illuminating than would be the abilities revealed by either type of test taken alone. In order to examine this question the records of 267 seventh- and eighth-grade boys in the assembling tests were separately plotted in relation to their scores in the intelligence tests. The correlation with "general intelligence" (0.23) was practically the same as in Figure 1, and the percents in each quadrant were either identical or different by but one point. The records, however, of 296 boys of the same grades in Picture Test II showed a somewhat closer correlation (0.34) with scores in intelligence. Yet the percent of pupils in each quadrant was highly significant. In A there were 28 percent of the pupils, in B 22 percent, in C 36 percent, and in D 14 percent. The reader's attention is especially directed to the fact that Group B contained 22 percent of all the pupils—in other words to the fact that more than one-fifth of them were low in intelligence but high in the ability measured by the picture test.

The Relative Importance of These Two Kinds of Ability

Of the relative importance of each of these two types of ability, readers must form their own conclusions. But it should be kept in mind that we are living in a world that is dominated on every hand by every known form of mechanical device and

machine. Every moment of present-day life is influenced directly or indirectly by the products of mechanical skill and genius. Is it not important that ability in this field should be discovered and developed? Rather than merely to dismiss our apparently stupid pupils as low in "general intelligence," and to relegate them to some convenient class, our time might profitably be spent in disclosing other kinds of intelligence of which they may be possessed.

Possibly it would be more appropriate to designate these mechanical tests by some other name for they are mechanical only in a limited sense. On the mental side they call for the ability to recognize parts of ordinary mechanical devices, for the ability to make judgments as to the reasons for the particular size, shape, weight, and nature of the parts—in short, for the mental ability to think through in some degree the same steps as those employed by the designer of each machine. Manually, they call for the dexterity required to put parts together to form the completed machine or device after it has been decided how they should go. Much of the performance of a typical child is, of course, mere trial and error manipulation, in which he hopes somehow "to make the thing work." But the nature of the various models is such that only a very low score is possible for the individual who depends merely upon thoughtless manipulation of the parts. A generous amount of the best kind of thinking is thus required to make a high score. It involves accurate perception, reasoning, and judgment applied to each model. In so far, therefore, as these mental processes are of general importance in every-day life, the ability demonstrated in assembling these models perfectly could well be called general intelligence.

Fictitious Stigmas

There is a strong and universal notion that a low score in such tasks as have here been called intelligence tests constitutes a disgrace, that must be shunned at all costs. To fail to receive a high rating in intelligence is regarded as a calamity. This feeling has come about partly through the loose use of the term general intelligence, and partly through a distorted estimate of the rôle of intelligence in human conduct. Absurd as it may seem, there is a brief, and a reasonable one, which can be held for the I. Q. which is actually low—as well as for the supposedly low

I. Q. For just as in man we find enormous individual differences in intelligence, so (fortunately) in the work of the world we find equally great variation in the character of the work to be done. As a matter of fact, the outstanding industrial tendency of the past decade has been to reduce the number of skilled jobs and increase the number of unskilled ones. The constant tendency of our modern machine age is in this direction, be it right or wrong. Again, consider the hundreds of thousands of menial tasks outside of industry that somebody must perform in every society. Is it not clear that happiness, contentment, and efficiency in such jobs are far more apt to come with a *low* I. Q. than with one that is high? Indeed, even when we consider the world's sweetest and most lovable characters, it is not always their high general abstract intelligence that makes the strong appeal. Haven't we in the academic atmosphere of our schoolrooms come to value the intellectual side of human nature out of proportion to its real significance in life? Surely far worse calamities can befall the human animal than that of being pronounced of low intelligence. Physical disease, a crippled body, an insane or actually feeble mind, with the multitude of tragic afflictions which this may imply—these and many other lamentable conditions which may befall should be kept in the background of our mind when we feel inclined to bemoan the lot of the stupid individual.

SUMMARY

This account attempts to point out some of the fallacies that are prevalent in the present-day conception of intelligence tests. It recalls the many cases of illustrious men who were called school failures, and calls attention to the large percent of pupils who at present appear to lack sufficient mentality to carry on current curricula, and suggests the query "Is it the curricula or the mental ability of the population that is at fault?" It criticizes present-day intelligence tests as narrow and academic in scope, being based largely on school success; suggests the loose use to which the term "general intelligence" is often put; and maintains that there are in fact many other kinds of intelligence than are now being measured by tests of that name. As an illustration the results of a study of mechanical ability are offered. Here it is shown that at least 20 percent of the pupils from a

typical school, who are below average in general abstract intelligence, are *above* average in the kind of ability required in four mechanical tests, the detailed nature of which is described. It is submitted that such ability may be of quite as general importance as that required to score high in the abstract general intelligence tests, in view of the fact that present environment is so largely permeated with the fruits of mechanical genius and applied science. Finally, it is maintained that there is a strong, but wrong tendency to attach a stigma to pupils scoring low in so-called intelligence tests Even for pupils whose true general intelligence is found after adequate testing to be low, there is ample opportunity for useful and happy lives—lives concerned with tasks for which they are, in fact, better adapted than are individuals of high intelligence.

MEASURING THE EFFICIENCY OF TEACHERS BY STANDARDIZED TESTS[1]

SAMUEL S. BROOKS
District Superintendent, Winchester, N. H.

My last article told how we used standardized tests and scales to measure the progress of pupils and to tell when they were ready for promotion. This one is planned to show how, at the same time, we were measuring the ability of the teachers to get results.

Besides knowledge of subject matter, one may recognize five main factors in a teacher's efficiency: (1) managing ability; (2) natural aptitude for the work; (3) method and technic of teaching; (4) interest and industry in her work; (5) and that vague thing, personality, somewhat indefinable but generally admitted to include character, temperament, personal appearance, manners, tact, etc. She must demonstrate ability to organize and manage a school in an orderly manner before any of her other abilities can do their work. With all the other factors present, a teacher's success can be but mediocre if she lacks greatly in natural ability as applied to teaching. She may have all the other virtues but if she lacks enthusiasm and industry she cannot inspire her pupils; and without an efficient method her other qualities will be ineffective. Finally, her personal qualities, ideals, and conduct must be worthy of emulation if she expects to influence properly the social and moral life of her pupils.

Now, no one of these factors can be accurately and objectively measured independently of all the others. But they all function cooperatively in getting results—results which are manifested in the development of knowledge, skill, and ideals among pupils. And these results *can* be measured by means of standardized tests.

Is it not customary to measure the efficiency of the workman, professional or otherwise, by the amount and quality of the work he turns out? The efficiency of the wood chopper is gauged by the number of cords of wood he can chop in a definite length of time; of a bricklayer, by the number of bricks he can lay in a day; of

[1] This is the sixth article by Superintendent Brooks on the general topic, "Putting Standardized Tests to Practical Use in Rural Schools."

the farmer by the per acre yield and profit of his crops; of the lawyer by the percent of cases he wins for his clients; of the doctor by the proportion of cases he cures; and so on, for almost any line of human endeavor we could mention. Experience has set certain standards of achievement in every kind of work and the efficiency of the worker is judged by the ratio of his product to these standards. If he does only three-fourths as much as the standard he is only 75 percent efficient.

Then why should not the efficiency of teachers be measured by the amount of work they turn out? Too long has efficiency been taken for granted or, at best left to the judgment of supervisors making guesses based on classroom observation more or less perfunctory of teachers' good looks, engaging personality, show of energy and enthusiasm, evidence of preparation, handling of supervisor's pet methods, etc. Although such observation is not without value in helping secure a fair estimate of a teacher's ability it does not alone furnish a safe and sane basis for judgment, and any teacher so judged to be inefficient has a right to complain of unfairness of treatment. Judgments based on mere classroom observation are not fair either to the teachers or to the taxpayers. The reasons why this is so were summarized in my first article, but they will bear repeating here.

(1) Such observations do not furnish a sound basis for judgment; (2) the superintendent's opinions are quite apt to be colored by personal prejudices toward an individual teacher or her methods; (3) classes often show at their worst in the presence of visitors; (4) even the teacher may fail to do herself justice under the critical eye of the superintendent; and (5) classroom observation takes no account of the actual results the teacher may be getting. Furthermore such observation is not only unfair but inaccurate. It is inaccurate because of all the reasons just given and because (a) some teachers do excellent work when the superintendent is present and shirk all the rest of the time, and (b), if such teachers do their own testing, even the results may be made falsely to appear satisfactory.

If the education of a child consists in his acquiring certain knowledge, skills, habits, and ideals that will make him a useful and desirable member of the society in which he lives, and if teaching is the proper leading and directing of the child in utilizing his natural abilities to acquire these things with the least possible

expenditure of time and energy, then why is it not eminently fair to all concerned to gauge the teacher's efficiency by measuring at definite intervals the progress her pupils are making in the acquisition of the prescribed knowledge, skills, habits, and ideals, provided we have well-defined standards of achievement for each grade such as the standardized tests furnish?

Anyway, I put the question squarely up to the teachers of my district at one of the teachers' meetings held early in the year. They were asked to decide whether they would prefer to have the superintendent estimate their teaching efficiency on the basis of what classroom observation he could make in schools so widely scattered, or according to the progress made by their pupils as measured by standardized tests.

As I had expected, the question evoked a lively discussion and some well-founded objections were raised. Most of the teachers were ready to admit the inaccuracy and unfairness of ordinary methods of rating teachers, but insisted that there was a large probability of the same weaknesses in the plan I proposed. Their chief objections were: (1) that knowing they would be judged by the results of the tests some teachers would be tempted to cheat in giving the tests, thereby perhaps gaining a higher rating than better and more conscientious teachers who gave the tests honestly; (2) that since there are in most schools a sprinkling of mentally deficient or even feebleminded children who under the most efficient teacher cannot be expected to make normal progress, the records of such pupils when averaged with those of normal children would seriously and unjustly lower the rating of the teachers; and (3) that of two teachers of equal ability one might have a school whose pupils averaged so much higher in intelligence than those of the other that she would undeservedly obtain a much higher rating. The majority thought that, if these principal objections could be satisfactorily disposed of, the plan would be worth trying. The few teachers who displayed marked lack of interest in the subject had already on other grounds shown themselves to be of the time-serving variety. I therefore ignored their attitude. But I wanted the intelligent acquiescence of the better teachers in some sort of a reliable teacher-rating scheme.

The first two objections I had foreseen and prepared for. As to the first, I explained that most of the tests were furnished in

two or three different forms so that the same forms would not have to be given twice in the same year. This would obviate the possibility of any teacher drilling pupils on the exact contents of a test, drill along the general lines of work suggested by the tests being not only legitimate but desirable. Furthermore, I pointed out that my plan of checking the work of the teachers in giving the tests would insure the immediate discovery of any serious attempt at cheating on the part of dishonestly inclined teachers—such as allowing more than the allotted time for each test or giving illegitimate aid to the pupils during the tests. This plan was for me to repeat in each school one or two of the tests *after* the teachers had given them all. Then if there was any great discrepancy between the results of the tests I had given and those a teacher had given, such discrepancy would indicate either dishonesty or gross carelessness in giving the tests.

The second objection offered a good opportunity for a discussion of intelligence tests and their uses. I passed around some samples of the Otis Group Intelligence Test and explained how, by the use of such tests, we could locate the pupils who were mentally incapable of making normal progress. The progress records of these pupils could be thrown out in calculating the teachers' ratings, and we might use only the records of pupils who graded 80 percent of normal or better by the intelligence tests.

The third objection was one which had not before occurred to me. I suggested that we leave the matter until our next meeting by which time I hoped to have a satisfactory solution. The plan I finally worked out and which was accepted as satisfactory by the teachers follows: From the results of the June tests the average scores by grades for each test were to be calculated for each school. Each of these average grade scores was to be divided by the corresponding standard score thus giving the percent which each grade score was of normal.

Table I illustrates the method by which these percents were obtained. The figures opposite the pupils' numbers are the rate and comprehension scores in reading for a fifth grade in the June tests.

All percents similarly derived for each school to be averaged to give the teacher's percentage mark. Then, to offset the differences in intelligence between schools, if the average of the I. Q.'s

in a school was less than 100, the difference between it and 100 was to be added to the teacher's mark and if the average of the I.Q.'s was more than 100, the difference was to be subtracted from the teacher's mark. This procedure served in the one case to discount the part of a school's progress that was due to superior native intelligence and in the other case to give the teacher an allowance to offset her school's mental disabilities. This plan disposed of the third objection mentioned above. Its accuracy of course depends in large part on the degree of correlation between the scores in intelligence tests and the scores in achievement tests. That the correlation is high will be shown later in another article. This scheme does away with the necessity of discarding the scores of subnormal children in calculating the ratings of teachers, although such discarding would save considerable work without materially affecting results.

Below are given concrete illustrations of how the ratings of several teachers were obtained at the end of the year. The first two are both very competent and successful teachers. In A's school the average of the I.Q.'s of all the pupils was 88. This school had thirty-two pupils, four of whom graded as feeble-minded. Twenty of them had I.Q.'s of less than 90. Only five

TABLE I. JUNE SCORES OF A FIFTH GRADE IN READING

Pupil Number	Rate	Comprehension
8	108	26
2	98	20
3	73	14
4	85	19
5	101	25
6	95	21
7	50	8
8	105	20
Average.....	89.4	19.1
Standard.....	93	20
Percent average score is of standard.....	96.1	95.5

had I.Q.'s over 100 and the highest was 122. In B's school consisting of thirty pupils, the average of the I.Q.'s was 111. The intelligence level in this school was unusually high just as in the other it was unusually low. There were no feebleminded children and only one pupil graded as very dull. Eighty-three percent of the pupils were normal or above. Three had I.Q.'s above 140. (All intelligence tests were given, corrected, and scored by the superintendent.)

Table II gives the grade percents (computed as shown in Table I) on each test in A's school—also the general average for the whole school. The 78, for instance, at the top of the second-grade column in Table II means that the second-grade average score in rate of silent reading was 78 percent of the second-grade standard score. In comprehension of silent reading their average score was only 69 percent of the standard score, and so on for each subject and for each grade. There are 98 of these percents in the

TABLE II. GRADE PERCENTS ON EACH TEST. TEACHER A

Subjects	Grades						
	II	III	IV	V	VI	VII	VIII
Silent Reading							
Rate	78	81	86	90	93	99	98
Comprehension	69	77	80	80	78	85	84
Addition	85	87	92	92	94	96	98
Subtraction	93	91	93	92	93	98	98
Multiplication	93	92	97	93	98	98	100
Division	74	79	82	87	92	95	97
Mixed Fundamentals	72	76	77	80	82	91	93
Arithmetical Reasoning	.....	70	73	78	81	88	87
Spelling	82	80	80	77	83	86	87
Writing							
Speed	96	102	101	104	111	107	109
Quality	67	68	67	65	62	62	65
English Organization	.....	92	94	92	88	94	93
Visual Vocabulary	.....	83	84	81	77	86	89
Geography	.....	.....	82	80	85	89	92
History	.....	.....	78	72	82	84	90
Grade Averages	80.9	82.9	84.4	84.2	86.6	90.5	92.0

General Average = 86.3

table. The general average for the school was obtained by adding all of them and dividing the sum by 98. The general average in this school was 86.3 percent, which means that the average progress of the school, as measured by the standardized tests, was 86.3 percent of normal. Table III gives the same data for B's school. In this case the general average was 108.4 percent of normal.

TABLE III. GRADE PERCENTS ON EACH TEST. TEACHER B

Subjects	Grades						
	II	III	IV	V	VI	VII	VIII
Reading							
Rate	102	105	111	114	117	123	122
Comprehension	93	101	104	104	102	109	108
Addition	107	109	114	114	116	118	120
Subtraction	114	112	114	113	114	119	119
Multiplication	114	113	118	114	119	119	121
Division	96	101	104	109	114	117	119
Mixed Fundamentals	94	98	99	102	104	113	115
Arithmetical Reasoning	.....	92	95	99	104	110	109
Spelling	104	102	102	99	105	109	108
Writing							
Speed	118	124	123	126	123	129	131
Quality	89	90	89	87	84	84	86
English Organization	.....	114	116	114	116	116	113
Visual Vocabulary	.....	106	103	108	108	105	111
Geography	.....	.....	104	102	111	111	114
History	.....	.....	96	95	106	107	109
Grade Averages	103.1	105.1	106.1	106.7	109.5	112.6	113.7

General Average = 108.4

Then according to the rating plan described above: A's rating = General average for A's school + (100 − Av. I.Q.) = 86.3 + (100 − 88) = 98.3. And B's rating = General Average for B's school − (Av. I.Q. − 100) = 108.4 − (111−100) = 97.4.

These are the ratings of two teachers of undoubted ability but with schools widely varying in average intelligence and rate of progress. Yet the rating shows the teachers to be of about equal ability. The difference in progress in the two schools is due to difference in the average mentality of the pupils. It would be

eminently unfair to expect equal progress with the two schools or to rate A as a poorer teacher than B because progress in A's school was less than progress in B's school.

Now let us consider the cases of two teachers of widely different ability but with schools approximately equal in size and in the average intelligence of pupils. Teacher C is a normal-school graduate, with several years' experience but with apparently little aptitude for or interest in the work, who tries to teach as she was taught regardless of her professional training. Teacher D is an enthusiastic girl of twenty years who has had one summer term at normal school and one year's experience. Apparently she got more out of her summer session than many do out of the whole course. Moreover, she has the ability to adapt her knowledge to classroom use.

Tables IV and V give the same data as Tables II and III but for the schools of C and D respectively.

TABLE IV. GRADE PERCENTS ON EACH TEST. TEACHER C

Subjects	Grades				
	II	III	IV	VI	VII
Reading					
Rate	80	84	88	92	95
Comprehension	75	81	80	85	90
Addition	84	85	90	91	94
Subtraction	92	90	89	96	95
Multiplication	90	89	94	90	96
Division	78	85	80	82	88
Mixed Fundamentals	73	74	75	78	84
Arithmetical Reasoning	.....	70	74	79	82
Spelling	78	75	80	81	89
Writing					
Speed	87	92	93	98	101
Quality	67	70	65	65	58
English Organization	.....	90	90	95	95
Visual Vocabulary	.....	85	82	79	76
Geography	.....	.....	83	87	90
History	.....	.....	76	82	80
Grade averages	80.4	82.3	82.6	85.3	87.5

General average = 83.9

TABLE V. GRADE PERCENTS ON EACH TEST. TEACHER D

Subjects	Grades				
	II	IV	VI	VII	VIII
Reading					
Rate	95	98	103	107	110
Comprehension	86	94	97	97	95
Addition	100	102	107	107	109
Subtraction	107	105	107	106	107
Multiplication	107	106	111	107	112
Division	89	94	97	102	107
Mixed Fundamentals	87	91	92	95	97
Arithmetical Reasoning		85	88	92	97
Spelling	97	95	95	92	98
Writing					
Speed	111	117	116	119	116
Quality	82	83	82	80	77
English Organization		109	107	107	109
Visual Vocabulary		98	99	96	101
Geography		97	95	104	103
History		93	87	99	95
Grade averages	96.1	97.8	98.9	100.7	102.2

General average = 99.3

The average of I. Q.'s for C's school was 98.8, and that for D's school was 102.2. This is a slight advantage for D's school but not nearly enough to account for the difference in attainment in the two schools. Calculated as before,

C's rating = 83.9 + (100 − 98.8) = 85.1.

And D's rating = 99.3 − (102.2 − 100) = 97.1.

Here again the relative efficiency of the teachers is reflected in respective ratings of their schools when full cognizance is taken of the average intelligence in the two schools.

We use averages rather than medians in computing the ratings of teachers because the schools are small with few pupils in a grade. In larger schools with twenty or more pupils to a grade the median scores could be as well used in figuring grade percents. In such case one should not neglect to use median I. Q.'s as well as median scores. And it might be well to mention here that when the scores of subnormal children are thrown out of the reckoning

their I.Q.'s should be discarded also; otherwise the teacher's rating would be considerably affected.

Although, of course, this rating does not include everything that should be taken into account in estimating a teacher's worth to the school and to the community it nevertheless covers one of the most important factors to be considered and furnishes a fairly objective test by means of which on occasion a teacher can be convinced of her own inefficiency. Certainly if a teacher fails seriously in this phase of her work she can not profitably be kept on the payroll for the sake of her personal appearance, good moral influence, managing ability or any other factor or factors that go to make up a good teacher.

In addition to a substantial general raise in salaries throughout the district for the current year, the school boards were persuaded to grant special increases of one or two dollars per week to certain teachers who rated 95 percent or better with ratings calculated as described. None of the teachers who failed to get such a raise made any complaint of favoritism, nor could they consistently do so since they had themselves accepted the basis on which their ratings were determined. Furthermore the teachers are working this year with the understanding that they will receive bonuses at the end of the year of five dollars for every whole unit that they increase their ratings over those of last year, the bonus not to exceed fifty dollars. Thus, if a teacher's rating last June was 89.2 and next June it has increased to 94.4 she will have increased her rating $94.4-89.2=5.2$ or five whole units. Hence she will receive a bonus of twenty-five dollars. I know that most of the teachers are working hard for a bonus.

A CYCLE-OMNIBUS INTELLIGENCE TEST FOR COLLEGE STUDENTS

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Intelligence tests were until recently used primarily to determine the mental age of children by the comparison of the chronological age with the mental age. When mental tests are given to adults, this type of analysis is no longer suitable since the intelligence of adults does not increase noticeably with age. The intelligence tests are used with adults in order to place a given person's intelligence with reference to the distribution of general adult intelligence. The scores are, therefore, more suitably expressed in terms of ranks or percentile ranks or of the standard deviation of the distribution of adult intelligence.

An intelligence test should be so adapted as to its difficulty that it will differentiate into significant and distinguishable groups the population for which it is intended. This cannot well be done if the test is either too difficult or too easy. In general, however, a fairly symmetrical distribution of test scores will be obtained for any given population with tests of considerable variation in difficulty. The test for which I am here submitting some norms was arranged in difficulty as nearly as possible to suit college freshmen.

During the last five years I have been experimenting with over fifty different varieties of mental tests with college freshmen at Carnegie Institute of Technology in its various departments. My procedure was the general one of giving the tests as early as possible in the freshman year, filing the scores until scholarship records and instructors' estimates could be obtained, and then determining the predictive value of each test by the correlations between its scores and the objective criteria of the students' abilities. I have found that instructors' estimates, on account of their unreliability, are, in general, unsuitable as a criterion by which to judge the predictive value of a mental test. The several instructors' estimates for the same student vary considerably more than the corresponding scholarship grades.

Lately I have used scholarship records almost exclusively as the general criterion to determine the predictive value of a mental test. The procedure is quite different, however, in work-

ing with individual tests, in which case one can use as a criterion the estimates of instructors because these estimates are then open to qualitative interpretation in the light of the examiner's personal acquaintance with the students tested. For the purpose of group testing of intelligence, the scholarship grades are perhaps the best available objective criterion.

There is considerable objection to the use of scholarship records as a criterion for determining the diagnostic value of a mental test; and this is not without justification, because the mental test may be a better index of intelligence than the scholarship grades. However, we must here sharply differentiate between the scientific problem of defining and diagnosing intelligence and the administrative problem of determining the relative predictive value of mental tests, entrance examinations, high-school certificates, interviews, and the like, for educational guidance. It is to the more restricted and immediate administrative problem that most American mental test investigators are devoting their attention. Let us hope that we may be able to tease out some scientific principles regarding intelligence and mental tests from our many laboriously tabulated forms of performance and correlation coefficients.

My justification for using scholarship grades instead of estimates of intelligence as a criterion for mental tests for college freshmen is that the student's retention and promotion in college depends more on his scholarship records than on any other single factor. The administrative question is this: By giving intelligence tests to our entering students, are we more able to predict their ability to do college work than by our present methods of admission? Available objective evidence, especially if we consider the combination of intelligence tests with evidence of high-school preparation in the fundamental subjects, certainly gives the affirmative answer to this question. Since scholarship is the one outstanding factor which determines academic success it is the only logical criterion by which to judge the predictive value of mental tests. It may be argued that the scholarship records do not predict success in life and that therefore some other criterion should be adopted for the selection of the students who are to be given a college education That is an entirely different question. The immediate question is to determine how intelligence tests can be of use in colleges constituted as they are at present. If

mental tests should be found to have no correlation with scholarship they could not be of use in admitting students, because they would not reduce the freshman mortality, even though they measured intelligence with absolute certainty. If the declared purpose of the colleges is considerably changed, and if the college curricula are fundamentally changed, it may be necessary for us to modify our mental tests so as to have predictive value in a different order of things. It is, therefore, quite possible that a mental test which is serviceable for admitting students to a college course may or may not be a test of intelligence. The empirical justification for mental tests is that they work, and the concept of intelligence which the tests are tacitly assumed to measure is after all an abstraction.

The criterion of academic success can be applied to mental tests in at least two different ways. One may correlate the mental test scores with scholarship records as has just been suggested, or one may determine the mental test scores of the students who leave college for various reasons in comparison with the mental test scores of those who remain in good standing. These two criteria usually give similar verdicts regarding a mental test, but they do not always coincide. A mental test may have predictive value for retention in college without being closely related to scholarship grades; such as the general technical information test which has been given, together with an intelligence test, to the freshmen in a large number of engineering colleges. The technical information test contains only extra-school items which an interested boy, during the high-school age, obtains by inquiring about the mechanical and electrical things in his environment. It is reasonable to suppose that the students who have acquired considerable general technical information on their own initiative will make better engineering students than those who have not availed themselves of such opportunities. This is verified by the fact that among those who make high scores in this test there are fewer students who leave college than among those who make low ones. However, the test does not correlate satisfactorily with the freshmen scholarship records which are heavily loaded with mathematics and physics and do not call for the general technical information of the test. These results will be reported more in detail elsewhere. My present purpose with the illustration is to show that academic success can be used as a

criterion for determining the predictive value of a mental test either by correlating the mental test scores with scholarship records or by studying the average mental test scores of the students who leave college in comparison with those who remain.

The correlations between scholarship grades and mental test scores vary from zero to +0.60 depending on the test used, the exact form of the criterion, and the particular group of students tested. In my experience with mental tests for college students I have never seen a correlation between test scores and scholarship grades exceeding 0.60. In fact they rarely exceed 0.5, and 0.4 or 0.3 is much more usual. Those who have been accustomed to work with mental tests for children are frequently disappointed at finding that the correlations for college students run considerably lower, but this seems to be universal. The reason is probably due to the fact that the success and rating of a college student depend on many factors besides his ability, whereas with children, intelligence plays a more exclusive rôle in determining school success. An intelligent college student will frequently have relatively low scholarship grades on account of lack of interest, social distractions, scattering of his talents, college athletics, financial and other emotional disturbances. These factors are usually absent with school children in the grades.

A still more fundamental reason for low correlations with college students as compared with those for school children is the fact that the school children represent a wide range in abilities, whereas college freshmen are a relatively select group representing a high, but rather narrow range of abilities as compared with the range of intelligence for the total population. It is well known that the correlation coefficient is reduced by restricting the correlation table to a narrow range of abilities. If intelligence tests were given to a sampling of one thousand individuals selected at random from the entire population and if all of these individuals so selected were attempting to do college work the correlation between their mental test scores and their scholarship grades would run very much higher than it now does. I have seen mental test enthusiasts plot a correlation table for scholarship and test scores and proceed to explain away the cases in the wrong quadrants in the light of their personal knowledge of the students. By eliminating the frequencies in the negative quadrants one can raise the correlation coefficients but such doctoring

of the data is, though well meant, scientifically criminal. The possible administrative use of mental tests with college students rests not only on the correlations between test scores and scholarship but also on the corresponding correlations between high-school scholarship and college scholarship. Since these correlations usually run lower than the mental test correlations one would be justified in combining them in an effort to increase the reliability of the predictions. That will be the subject of a later report.

Six tests were selected from among those which have been tried with college freshmen. These six tests were arranged in the "Psychological Examination for College Freshmen and High School Seniors" which is Test IV in the series of six tests which were devised for engineering freshmen. The following six tests constitute Test IV:

1. *General information.*—These are some sample items from the test:

Slice is a term used in
bowling golf tennis football

The *silo* is used in
fishing farming hunting athletics

The response is to underline one of the four given words. Although the general information test is not a direct test of intelligence, it is an excellent indirect test of that attribute. Other things being equal it is safe to assume that the bright person will acquire unwittingly a greater range of information than the mentally less gifted person. That social opportunities constitute one important factor in the acquiring of general information is, of course, apparent; but it is certain that this factor also influences the score in other apparently more direct intelligence tests. Empirical evidence on this question is difficult to obtain because increased social opportunities and wealth are in general possessed by the mentally more gifted part of the population. An exhaustive study of this question would necessitate the differentiation of that part of the evidence of intelligence which is due to exposure in the environment usually possessed by the mentally superior part of the population. Be this as it may, the fact remains that a general information test does serve to differentiate more or less roughly the students who

are able to succeed in college work from those who are, for various reasons, unable to survive their freshmen career. The differentiation is only a rough one, and so is every other known criterion for student selection.

2. *Analogies.*—This test is given in this examination in a form different from that in which the analogies test is ordinarily given. These are some sample items:

Underline two words with the same relation as *eraser* and *ink*.
lightning storm water dirt clothes

Underline two words with the same relation as *doctor* and *patient*.
nurse lawyer hospital court client

Inspection of these analogies items will show that they are slightly more difficult in this form than in the form ordinarily used. The customary form of the analogies test gives two words to establish the type of analogy and the set for the answer is practically given by stating the first word of the required analogy so that the candidate only supplies the single missing word. In the present form the nature of the analogy is given by the two words and the candidate must select two words from the given five words which have the same relation as the two given words. This is more confusing especially since the three-word distractors are so selected that they have reasonable associations with both the two given words and with the two required words. It is perhaps more suitable for college students than the easier form.

3. *Sentence completion.*—This is the customary Ebbinghaus test, especially in the form in which it has been developed by Trabue. Since this test is so well known a single sample will perhaps suffice.

The poor.....is hungry because.....has.....
nothing to.....

This test has good diagnostic value although the correlations between its score and scholarship for college students do not even approach the correlations that are obtained with school children for the reasons previously suggested. The correlations for college freshmen are usually in the neighborhood of 0.35. The chief difficulty with this test is the scoring. Several years ago we made the attempt to prepare lists of acceptable words for each blank space in the sentence. This was used by giving credit for inserts which agreed with one of the samples on the official list

and by counting as wrong any other inserts. This was found unsatisfactory and we later prepared a more extended list with good inserts and poor inserts. The good inserts were given more credit than the poor ones. The scoring of the papers with this arrangement was found by the examiners to be a tedious job, although that should not be a permanent obstacle in the use of the test if its diagnostic value is higher than that of other tests which can be scored in a simpler way. Its diagnostic value is, however, not superior to that of the other tests in this examination and for this reason it was eliminated in the 1920 edition. The test for which the norms are here reported is the 1919 edition which included this sentence completion test.

Perhaps the most serious obstacle in the use of an official list of acceptable inserts for the sentence completion test is that a clever student will sometimes hit upon some novel inserts which make an original and grammatically correct sentence. Such candidates are penalized for their originality. To obviate this difficulty in the scoring we adopted the plan of accepting any good sentence which was grammatically correct and which was, in the main, sensible. Thus the sentence "There are ten days in a week" would not be accepted, because it is not sensible, although it is grammatically correct. However, in the sentence "It is very *easy* to become *well* acquainted *with* persons who *are* timid," in which the italicized words are inserts, there might be some difference of opinion among examiners as to whether the sentence is acceptable because one would not ordinarily say that it is easy to become well acquainted with timid persons. In order to avoid this source of ambiguity, we finally tried to score the test by accepting every sentence which was grammatically correct, irrespective of its content. This seems rather extreme but in practice it seems to be more satisfactory than any of the other methods of scoring this test. In that case a sentence like "There are ten days in a week" would be acceptable, but it is never written. Even if it were written by a smart student it would not score against his intelligence but, if against him at all, on the basis of discipline. The last mentioned method of scoring the sentence completion test is particularly helpful in deciding ambiguities arising from differences of opinion among examiners. As a matter of fact it does not alter the correlations seriously to modify the scoring of this test but even with the last men-

tioned scoring method the time consumed is much greater than that required for any of the other tests in the series.

4. *Syllogisms.*—The instructions are to underline the word *true* if the conclusion is true, and *false* if the conclusion is false. These are some samples of the test:

Since all metals are elements, the most rare of all the metals must be the most rare of all the elements.

True False (Underline one)

We must sell our output either to consumers or to retailers. It is not feasible to sell our entire output direct to the consumer. If we sell part of it direct to the consumer the retailers will not buy the remainder. Therefore we must sell our entire output to the retailers.

True False (Underline one)

The syllogism test is one of the good tests but it is not the fundamentally important test of reasoning ability that we might at first suppose because a very small fraction of spoken and written English is phrased in syllogistic form. A course in logic and familiarity with Euler's circles affect the score in this test markedly but since the test is prepared for college freshmen who have not yet studied logic this does not constitute a practical difficulty. The conclusions for some of the syllogisms are indeterminate and it has been suggested to give three choices in the response to this test, namely, "true, false, indeterminate"; but if a conclusion is indeterminate it is also false in that it does not follow from the premises. Since two responses would in that case be acceptable the test was given with only two alternative answers, true and false.

When the content of the syllogism is known to the candidate it seems to be easier than when the terms are unfamiliar even though the syllogistic form remain the same. This is a good problem and should be investigated by preparing three syllogism tests identical as to the form of the syllogisms but differing in that one should be expressed in terms familiar to the candidate, one in unfamiliar terms, and one in terms of symbolic notation such as letters It would be interesting to ascertain the relative diagnostic value of syllogism tests with special reference to these three types of content. I have already investigated the relative predictive value of syllogisms with monotonous and varied content. The criterion used for this comparison was the scholarship grades of college students. It may be that this is a special case

more general principle that the diagnostic value of a mental ... enhanced by making it varied in form and content.

5. *Quotations.*—The candidate is asked to read a quotation of two or three lines from some well-known author. Below the quotation are four statements, two of which agree, and two of which do not, with the quotation. The candidate is asked to check the two statements which agree with the given quotation. This is an example:

"No great genius was ever without some mixture of madness, nor can anything great or superior to the voice of common mortals be spoken except by the agitated soul." (Aristotle)

Check two of the following statements with the same meaning as the above quotation.

.....Genius is essentially hard work and persistence.
.....Contented and serene characters are the ones that produce works of genius.
.....Genius and insanity have certain elements in common.
.....Strokes of genius are likely to come after times of great disturbance or stress for the individual.

Some proverbs are used to advantage in this test; as, for example:

"Long absent, soon forgotten."

Check two of the following statements with the same meaning as the above proverb.

.....Far from the eyes, far from the heart.
.....Absence makes the heart grow fonder.
.....Distance lends enchantment to the view.
.....Out of sight, out of mind.

6. *Number completion.*—This is the number completion test which has become well known since it was adopted as one of the tests for the Army Alpha. It was given before the war as a separate test to engineering freshmen with whom it had higher predictive value than with students in other courses. It was retained in Test IV as a representative of the numerical form of problem since the arithmetical problems in the original try-out editions consumed too much time in comparison with the other test items. My original justification for devising the number completion test was that it affords an opportunity to test the candidate's ability to form generalizations. The following is an example of the number completion test as used in Test IV. Write the two numbers that should come next:

60 52 44 36 28 20 ....

The complete instructions for the test are given more in detail in the first part of the examination pamphlet.

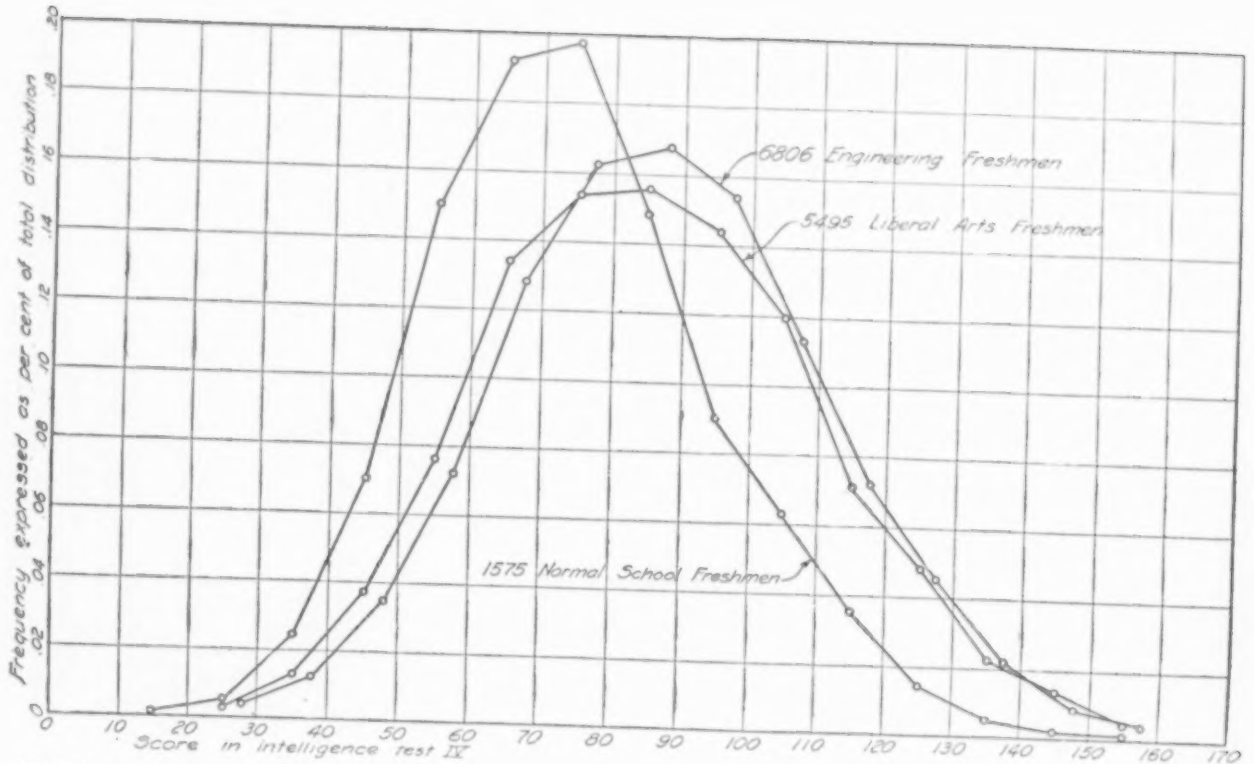

FIGURE 1. DISTRIBUTION OF SCORES IN INTELLIGENCE TEST IV FOR ENGINEERING, LIBERAL ARTS, AND NORMAL-SCHOOL FRESHMEN

TABLE 1. DISTRIBUTION OF THURSTONE INTELLIGENCE TEST IV SCORES OF ENGINEERING FRESHMEN IN FORTY-THREE ENGINEERING SCHOOLS, 1919–1920

TABLE 1. DISTRIBUTION OF SCORES IN INTELLIGENCE TEST IV FOR ENGINEERING, LIBERAL ARTS, AND NORMAL-SCHOOL FRESHMEN

TABLE 1. DISTRIBUTION OF THURSTONE INTELLIGENCE TEST IV SCORES OF ENGINEERING FRESHMEN IN FORTY-THREE ENGINEERING SCHOOLS, 1919–1920

| SCHOOLS | NUMBER OF STUDENTS WHO OBTAINED INDICATED SCORES | | |

TABLE II. DISTRIBUTIONS OF SCORES IN THURSTONE INTELLIGENCE TEST IV OF FRESHMEN IN THIRTY-FOUR LIBERAL ARTS COLLEGES

College	Number of students in each group (see headings of columns)																			
	0 9	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 99	100 109	110 119	120 129	130 139	140 149	150 159	160 169	Av.	σ
Albright College				2	4	5	7	4	5	3	4	2		1				76.6	32
Alfred College					1	1	5	6	13	8	12	4	2	2	1			93.3	55
Center College				1	4	8	9	14	11	5	6		1			1		83.0	28
Coker College		1	3	5	14	25	24	10	10	6			1					61.9	99
Dickinson College				1	3	5	17	19	25	16	15	10	9	5		1		98.0	128
Earlham College			1	1	3	19	21	23	12	29	14	13	10	2	3			86.0	133
Grinnell College			1	1	6	16	21	31	46	40	28	20	11	3	5	2	1	91.1	232
Hanover College					1	6	15	7	13	5	6	3	1		3			82.5	60
Juniata College				2	1	8	10	9	2	1	7	2						79.0	92
Lafayette College				3	8	21	29	31	43	40	32	20	15	7	2	2		88.5	253
Lehigh University			1	1	3	9	19	24	32	54	45	13	15	5	4			93.0	225
Lincoln University		1	3	9	20	15	13	11	5	4	1	5		1				61.6	88
Muhlenberg College				2	7	8	26	24	29	34	30	11	8	7	5	3		90.5	144
Mount Union College				1	1		5	7	13	10	10	10	3	2	4			97.2	66
Northwestern University			1	6	11	39	76	114	105	111	94	54	31	21	6	5		89.5	674
University of Pennsylvania			1	4	9	13	44	31	38	35	27	33	31	9	8	2		92.0	285
Pennsylvania College				3	9	8	15	14	12	14	8	12	6	3		1		86.3	100
Pennsylvania College For Women					1	6	14	22	18	15	11	7	4	2				86.8	100
University of Pittsburgh					1	5	13	9	7	6	11	6	2	1				85.7	41
Reed College				1	1	3	9	10	16	17	13	16	9	6	4	1		98.3	106
St. Joseph's College				1				2	2	7	9	9	2	2	2		1	107.0	37
Susquehanna University				1	2	4	9	10	10	10	8	5	5	1	2	1		90.0	68
Swarthmore College					1	5	11	20	22	24	20	13	15		3			99.0	134
Temple University		2	1	7	19	37	46	38	32	25	16	12	3	3	2			75.7	243
Thiel College						6	9	15	13	14	14	5	6	6	4	2	1	95.6	94
University of Texas			6	19	56	94	159	161	143	95	65	33	16	8	7	3		78.0	860
Ursinus College				2	5	14	23	28	37	29	25	20	12	2	3			88.5	200
Villanova College					7	10	11	8	17	13	11	2	2	3				82.1	89
Washington University, St. Louis				1	7	11	37	67	68	71	85	40	33	19	6	6	1	95.9	952
Westminster College				1	2	8	10	21	16	8	12	2	4		2	1		84.5	87
Wilson College					1	5	17	20	19	19	8	8	4	3				86.5	104
Western College For Women				1	4	8	15	16	18	19	10	3	1		1			87.0	98
Total		4	18	76	209	422	732	846	852	787	657	395	242	123	77	31	4	86.6	5495
Percentile Rank		0	0	1	4	9	14	24	39	54	69	77	87	93	97	98	99	100		

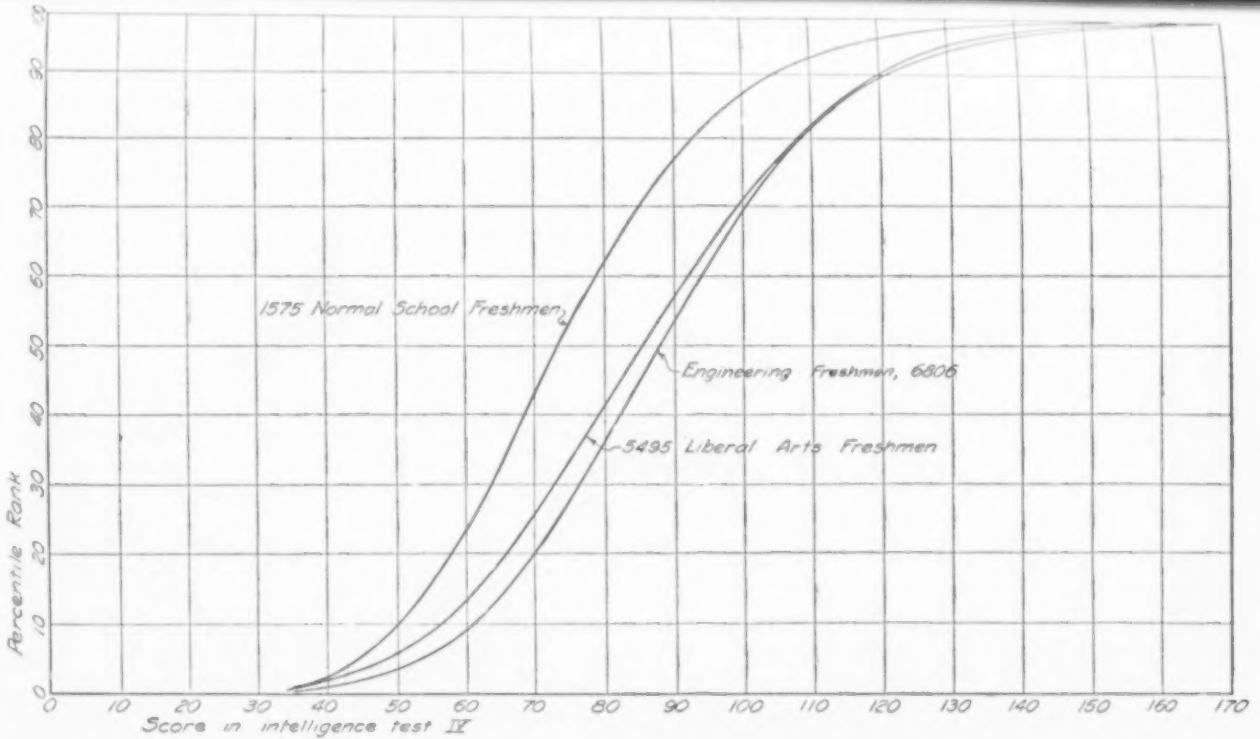

FIGURE 2. PERCENTILE RANKS FOR ENGINEERING, LIBERAL ARTS AND NORMAL-SCHOOL FRESHMEN CORRESPONDING TO THEIR SCORES IN INTELLIGENCE TEST IV

TABLE III. DISTRIBUTION OF SCORES IN THURSTONE INTELLIGENCE TEST IV OF STUDENTS IN TEN NORMAL SCHOOLS

Schools	Number of Students Who Obtained Indicated Scores																		
	0 9	10 19	20 29	30 39	40 49	50 59	60 69	70 79	80 89	90 99	100 109	110 119	120 129	130 139	140 149	150 159	160 169	No	AV.
Cumberland Valley Normal School			1	8	13	31	49	47	38	23	15	7	9	1				252	79.2
Edinboro Normal School				1	5	7	15	7	12	7	4	2	2	1				63	77.0
Keystone Normal School		1	1	3	16	29	30	30	21	19	6	9	2	1				163	72.1
Lock Haven Normal School				3	3	8	11	15	9	8	7	3	2	1				70	78.7
Millersville Normal School					2	1	6	8	21	10	15	13	9	1	2	1		89	95.5
Slippery Rock Normal School			2	9	15	36	35	40	25	18	12	3	3					198	71.2
West Chester Normal School				7	12	41	50	55	40	19	17	8	9	1	2			256	75.2
Farmville, Va. Normal School			2	9	19	48	41	45	23	9	6	3						200	67.6
Philadelphia Normal School For Girls.					3	6	8	22	20	14	12	15	3	2				103	88.0
Indiana, Pa. Normal School.			1	5	20	31	43	38	26	15	6	1						186	68.6
Total		1	7	90	108	238	303	307	235	142	100	57	29	8	9	1		1575	74.8
Percentile Rank.		0	0	2	6	17	34	54	70	82	90	96	98	99	99	100			

After selecting six tests as the most serviceable for the prediction of scholarship grades of college freshmen our next problem was to determine the manner in which these six tests were to be presented. The customary procedure had been to give each test separately, distributing and collecting the papers for each of the six separate tests. This consumes considerable time and it also complicates the handling of the scores for administrative purposes. For purposes of research the test scores should, of course, be analyzed separately; but when this had been done our task was to combine them in one examination with a single intelligence rating. We were not sufficiently enthusiastic about the method of partial correlation to evaluate the fifty separate tests by this method. Each of the six tests gives correlation coefficients with scholarship grades in the vicinity of 0.30.

If the six tests were arranged in succession in the test pamphlet with one time limit for the whole examination the slower candidates would not give any returns on the last test. In order to avoid this difficulty the six tests were arranged in cycle form. Every sixth test question is, therefore, of the same type. No matter how fast or slow the candidate is, he will give returns on practically the same number of questions from each of the six forms. The test in its final form is, therefore, an omnibus test in cycle form and has been described as a cycle-omnibus test. This type of test should not be used when the diagnostic value of each part is being investigated. For administrative purposes, however, it is far superior to the separate giving of the six tests.

A test of this kind with the items arranged in increasing order of difficulty would be more properly called a spiral-omnibus test. This has been done with the Army Alpha questions by the Bureau of Personnel Research at Carnegie Institute of Technology.

7. *Directions.*—There are two forms in which the instructions for a cycle-omnibus test can be arranged. One may give the instructions in complete form the first time a certain type of test question occurs in the test. The instructions may be gradually abbreviated for the successive repetitions of the same type of question. Thus the number completion test is given with complete instructions the first time it occurs and with the sample answers printed. The next time it occurs the instructions are abbreviated and no further answers are given. Another arrangement of the instructions is to give them sample questions as the

first part of the test which is followed by the test proper without any instructions whatever. Test IV was arranged in the first-mentioned manner. This necessitates a certain minimum amount of instruction material throughout the test but this has been reduced so that the reading time for the repeated instructions requires but an insignificant fraction of the total time of the test.

Tables I-III and Figures 1 and 2 give the norms of performance in Test IV for a number of engineering colleges, liberal arts colleges, and normal schools. It will be noticed that the engineering freshmen and the liberal arts freshmen show practically the same distribution according to the intelligence test with a slight noticeable advantage in favor of the engineering students. The normal-school students do not make as high scores on the intelligence test as the college students. This is perhaps not unreasonable in view of the fact that the standards of selection of college students are in general higher than those for normal schools.

In subsequent reports I shall present in detail the predictive value of the test with special reference to scholarship and withdrawal of students as expressed by the various correlation coefficients.

THE MEASUREMENT OF HIGH-SCHOOL ENGLISH

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University of Illinois

High-school teachers of English are found almost everywhere to be hostile to any suggestion of scientific measurement of the results of their work. To some the word *measurement* is a veritable red flag.[1] To others, the use of scales is "interesting," but necessarily futile and misleading.[2] And the more that measurement of English work is urged and argued for, the more determined and better organized becomes the opposition.

On the other hand, leaders in education are demanding "justification for the emphasis on English."[3] Their condemnation of the work of the English teachers is based, for example, upon studies which show many high-school seniors with composition ability no better than is usually possessed by grade children,[4] or which discover 93 percent of the seniors in the high school of an excellent system matched in writing ability by an equal number of pupils in the freshman class of the same school.[5] If this, they say, is all that can be attained by three or four years' instruction, let English give way to some subject that can show results. Not that they are hostile to the subject; on the contrary, they are in complete sympathy with what the English department professes to teach. But they are expecting from English just what they are expecting—and finding—in the case of every other established school subject, some definite product of appreciable amount to which one can point and which everyone must recognize. Such a product, scientific study fails to discover in the case of English to an extent that would at all justify the enormous expenditure of pupil time and energy on the subject.

Of course it has been the fashion to say that this disagreement is due to the well-known ignorance of English teachers of the

[1] Ward, C. H. "The scale illusion," *English Journal*, 6:221–30, April, 1917.

[2] Parker, Flora E. "The measurement of composition in English classes," *English Journal*, 8:203–8, April, 1919.

[3] Judd, C. H. *Psychology of high-school subjects*. Boston: Ginn and Company, 1915. p. 134.

[4] *Report of the high-school visitor, University of Illinois, 1919-1920*. Urbana, Illinois: University of Illinois, 1920. p. 46.

[5] Courtis, S. A. *The Gary public schools: measurement of classroom products*. New York: General Education Board, 1919. p. 224.

science of education. Since measurement of educational products is something they know nothing about, their hostility is only natural, and will disappear when they have learned more about the subject. Such a statement is, however, only a half

CHART OF HIGH-SCHOOL ENGLISH

High-school English includes

- Literature
  - appreciation
    - of the artist's: feeling; imagination; thought
    - of special technics: verse; stories; novels; essays, etc.
  - knowledge about: authors; books; human nature, social history, etc.
- Inculcation of ethical ideals
- Writing
  - neatness: handwriting; papers, etc.
  - conveying of fact: conventions of language; efficiency in expression; technics of special forms
  - conveying of feeling: meaning of art; artistic use of language; technics of literary forms
- Training of mental processes: keen observation; logical thinking; imagination; spontaneity and expressiveness; socialization of attitude; tolerance, *etc.*
- Reading
  - greater speed
  - greater comprehension: scrutiny of words; analysis of thought
  - wider reading habit: classics; modern novels; magazines; newspapers
- Incidental information concerning: vocations; politics; social life; science; history; economics; *etc., etc.* — from assigned reading, theme subjects, oral discussion, *etc.*
- Speech
  - manner: poise and self-confidence; posture, gesture, *etc.*; pronunciation, vocalization, expression, *etc.*
  - material: correctness according to conventions of language; organization of material

truth. The situation is complicated also by a profound misunderstanding on the part of educational investigators. The English problem has been regarded by them very superficially indeed. Experienced in other fields, they have been over hasty to diagnose the situation in English. Inconclusiveness of results and an outcry from the English teachers have been the natural and inevitable consequences. What is now needed is a new attack on the problem from a ground of mutual understanding, and to help establish such an understanding is the purpose of this paper.

There is a definite reason why no scientific study of high-school English yet made has discovered results commensurate with the pupil time and effort given to the subject. Failure of all such efforts is at once understood from a study of the above chart, which attempts to list, in a grouping as logical as possible, the things which the English teacher is supposed to do.

This chart is the result of an attempt to list all the things which the high-school teacher of English is supposed to accomplish in his forty or fifty minutes a day for five days of the week. Very possibly there are other items, but surely these are sufficient to indicate the source of the difficulty. The Latin teacher is teaching Latin, the algebra teacher is teaching algebra, the physics teacher is teaching physics, but just what is the English teacher teaching? Well, his work falls under the fifty-odd headings of the chart. It includes a dozen or more of very complicated skills, several dozen branches of knowledge, and all of those intangible but highly important "attitudes of mind" which make an individual's life a success or a failure. And it is objected that he does not produce *measurable* results.

But to show just how the situation exists in concrete terms, let us consider a typical high-school English course of study. The following is the plan of the course used in the high-school of a large city, and it is typical of the sort of thing done in most well-organized schools. We shall give only the plan for the second year, as those of the other years are very similar.

COURSE OF STUDY IN HIGH-SCHOOL ENGLISH

Second Year

First Half	*Second Half*
I. LANGUAGE	
A. Paragraphs	A. Paragraphs
B. Sentences	B. Sentences
C. Words	C. Words
D. Prosody and figures of speech	D. Prosody and figures of speech

II. LITERATURE

A. Eliot—*Silas Marner*	A. Shakespeare—*Merchant of Venice*
B. Arnold—*Sohrab & Rustum*	B. Tennyson—*Idylls of the King*
C. Lowell—*Sir Launfal*	C. Shakespeare—*As You Like It*
D. Coleridge—*Ancient Mariner*	D. Dickens—*Tale of Two Cities*
E. Burns—*Cotter's Saturday Night*	E. Cody—*Great Poets*
F. Shakespeare—*Twelfth Night*	1. American
G. Hawthorne—*House of Seven Gables*	
H. Cody—*Great Poets*	
1. American	

III. ORAL EXPRESSION

A. Dissertations	A. Biography of American authors and statesmen
1. American poetry	B. Periods in American literature
2. American novels	C. Debates
B. Debates	

IV. WRITTEN EXPRESSION

A. Narration	A. Description

V. ELOCUTION

A. Poise	A. Poise
B. Voice	B. Voice
C. Articulation	C. Articulation

Comparing this course of study with our chart, you will notice at once that certain of the chart headings are included and that others do not at first seem to be. For instance, *Elocution* in the course of study has clearly to do with the *Manner of Speech* of the chart. *Language* concerns the "Conventions of Language" as used in both *Writing* and *Speech*. *Oral Expression* has to do with "Technics of Special Forms," which appears in the chart after the division *Writing*, and also with "Organization of Material," which is placed as a broad heading under *Speech*. *Written Expression*, is, according to the course of study, concerned merely with the technics of narration and description, but it is easily seen that all the habits, skills, and knowledge indicated in the chart after *Writing* must be included in any teaching of narration and description. And this is not all; when you have a pupil write a story, you teach technic of story writing; but you must also in your conferring over his plan and in your criticism of his execution, put time and effort on all the things listed in the chart under *Training of Mental Processes*, and on many more as well. You must stimulate his imagination, guide him in logically thinking out his plot, aid him in observation of people and things, encourage spontaneity, and so on.

But the *Training of Mental Processes* and *Inculcation of Ethical Ideals* must be given the greatest amount of time and energy in the work labeled in every course of study simply as "Literature." Look at the list of classics in this course of study, a list that is quite representative of this sort of work throughout the country, and picture just what is done by teacher and class when these works are being "studied." There is always, of course, some information about the author and what he has written. This practically always includes a sketch of the historical epoch in which he lived as well as an analysis of his life and thought. When volumes have been written upon every one of the writers whose work is taken up, wealth of material is certainly not lacking here, and there is every temptation for the teacher to emphasize vitally important lessons to be learned from the lives of the authors—lessons, however, whose "results" in the pupils' lives are naturally impossible clearly to discern.

Then there is what the chart describes, under *Literature*, as "Knowledge about Human Nature, Social History, *etc.*" What this means for class time and attention in English is best described by the following quotation from a manual on the teaching of high-school literature:

> The class time may be used for the agreeable task of giving the pupils a background for the story. For instance, if the novel is *Henry Esmond*, there is an endless amount of material which can be used to arouse an interest in the picturesque age in which the scene is laid. Queen Anne, Dick Steele, the Pretender, and other characters who flourished in the early seventeen-hundreds; coffee-houses and theatres; brocades, laces, masks, and beauty patches; velvet coats, periwigs, swords and shoe buckles; carved furniture, sedan chairs and stage coaches; all these persons and things afford unlimited means for individual talks by pupils, or discourses by the teacher. The beautiful pictures available for this period will add variety to the study; and many fragments of literature, either old or modern, can be used to supplement the work. The teacher might even read aloud some chapters of that delightful story, *Monsieur Beaucaire*, or parts of *The Bath Comedy*. He might also take pains to show what was going on in America, during Queen Anne's reign, and make some attempt to interest the pupils in the *Virginians*, as a possibility for outside reading.

Pretty hard to show measurable results there, one would think. The educational investigator will at once object that all of this is not English, and of course it is not. It is, as the writer states, "background for the story." It is history, not properly "English." But what is to be done about it? So long as English

must take up the study of books which were written in another age, concerning institutions and events of another age and even another country, just so long must a very large part of English time be given to history. If the scientific student of education wishes to get results in English that are comparable with those in algebra or history, this difficulty must first be solved either by the testing of the history teaching as history teaching, by the correlation of history and English so as to remove this work from the English class, or by the selection of books that will not require that a historical background be taught.

And what is done by the English class with the rest of the literature time? The answer may best be indicated by some questions from a teacher's manual for the study of English classics which is widely used, and the method of which is followed generally whether this manual is employed or not. Under each of the headings only a few questions are here given, these being typical of the whole list. We shall take the questions relating to the first book of those listed on our course of study, *Silas Marner*.

Development of the Plot

How much of the story takes place before the story opens?
How would modern means of communication have foiled Godfrey in his desire to keep some of his secrets?
Why is Mrs. Winthrop introduced?
Where is the climax in interest reached?

Characters

How many principal characters are there?
Are the characters shown most by action, conversation, or the author's comment?
What do you think of George Eliot's power of characterization?

Method and Style

Which is more important in *Silas Marner*, plot or character?
How did George Eliot's scholarship affect her style?
Do the people speak naturally?

It is in such analysis of the books studied that the time of the English class is largely taken up. The various kinds of "Appreciation" listed on the chart under *Literature* are certainly taught; and there is constant *Training of Mental Processes*, especially training in logical thinking. There is, in fact, every opportunity given and used for the development of that capacity which we call general intelligence. But is this English? It is, as English is now constituted; and it will continue to be English unless the senti-

ment of the English teaching force, of the administrative officers, and of the general interested public makes some radical change. But how about tangible, measurable results? There, of course, is the difficulty. At least three-fifths of the English time, and often much more, is devoted to Literature. To trace the results of this time, when the work is of the character described, is indeed a hard matter.

One element in literature study, the *Inculcation of Ethical Ideals*, is so important that perhaps the best-known writer on the teaching of English regards it as the foremost aim of the English course. In this he is followed by many teachers, and there are no English teachers that do not make moral instruction an essential part of all literature study. No matter what the classic, class time or theme-writing time is devoted to discussion of the noble qualities of the characters, to consideration of the ways in which evil character and action deserve and receive condemnation or failure, and to the treatment of those questions which tend to elevate and strengthen the character of adolescent boys and girls. Whether this is properly "English" or not, the study of life as presented by our great authors furnishes an opportunity for ethical teaching that is too good to be lost and one which the public schools rightly feel must be vigorously used. The English teacher of high moral nature and with the ability to impress strongly upon his pupils the moral lessons of literature is felt to be a force whose work is so great as to transcend any methods we have for its measurement. Before this phase of the English course, the scientific investigator stands helpless, yet in any estimate of the whole of high-school English, *The Inculcation of Ethical Ideals* must have full and sufficient consideration.

One heading on the chart, *Incidental Information*, needs a word of emphasis. In English, as in no other subject, there is personal contact between pupil and teacher, and there is the most spontaneous sort of class discussion. There is therefore every opportunity for the exchange of experience and the statement of opinion both by pupil and teacher. In consequence, there is constant comment on current events; there is constant narration of anecdote; there is constant asking of question and giving of answer upon every subject under the sun. The teacher of broad culture and experience constantly emanates information and influence in a way hardly possible in any other classroom. For the content of

English is the whole of life. The themes written concern all of the knowledge, thought or feeling of the young authors; the criticisms of them reflect all the experience and philosophy of the teacher. And the books read, either as classics for the study or from the broader fields of "outside reading," concern all kinds and conditions of men, of all countries, stations, and ages. The English teacher, the pupil, the administrative officer, and the community regard this aspect of English work as of inestimable value. But there is no score card for it. Its measurement is, and will long remain, an unsolved problem.

Is high-school English, then, to be discredited by the movement for the scientific measurement of results in education? Is the scientific investigator yet in a position to say that results do not justify the devotion of so large an amount of time and energy to English work? Hardly so. In fact, the measurement of results in English has scarcely begun. The complexity of the question has not even been realized, and in consequence much trouble has been aroused by premature judgment. There is at present among high-school English teachers a definite and determined hostility to all measurement, simply because educational investigators have rushed to conclusions. This condition is very deplorable, for no great progress is made in any subject except by the cooperation of all parties concerned, and this cooperation is especially essential in a subject such as English. There is enough prejudice about the problems of the English teacher anyway, for the complexity of the subject has already produced numberless violent differences of opinion among teachers. It is unfortunate that the scientist should add still further to the disagreement. He is the one who should have the all-inclusive, the unbiased view. And it is to such a view that this article has endeavored to contribute.

After the English problem is completely understood, then real plans can be made for measuring results. It seems likely that such plans will be based upon some such analysis as is attempted by the chart here shown. The chief point to hold in mind, however, is that analysis of conditions must come first; scientific measurement afterwards.

ANALYSIS OF READING ABILITY[1]

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A study of the society's yearbook[2] will convince the most skeptical that reading is a complex of abilities, not a unit ability. For some time the outstanding fact in the measurement of reading has been the lack of correspondence between the scores of individuals in a series of tests, labelled reading tests, but very evidently calling for different types of reading responses. Particularly significant have been the disagreements between correlations of scores in intelligence tests and scores in various types of reading tests. Some of these correlations are as high as those between intelligence tests themselves, while others are very low. Disagreements of this sort are indications of unsolved problems; but to one who is directing constructive studies in developing better methods of teaching reading, some fundamental analysis of the situation is essential as a working hypothesis, even though the analysis be tentative and incomplete. My purpose here is to present the conclusions upon which the Detroit constructive work in silent reading is at present based.

Reading, however, ought not to be considered in isolation. In order to attain the maximum of success in a single subject, there must be unity of planning and coordination of effort from subject to subject. Reading must be defined in terms which will make clear the essential nature of what is taking place in the whole educational process.

The definition I consider fundamental for reading and for all other forms of educational activity, is that the basic function of education is to increase the child's control of his own behavior. This definition affords a basis for measuring the relative efficiency of different methods of teaching. In other words, that experience is most educative which produces the largest growth in control of

[1] Address delivered at the meeting of the National Society for the Study of Education at Atlantic City, N. J., February 26, 1921.

[2] *Twentieth Yearbook of the National Society for the Study of Education. Part II: Report of the Society's Committee on Silent Reading.* Bloomington, Illinois: Public School Publishing Co., 1921.

behavior. If we examine the child from this point of view, we find that he differs from the man in his degree of development in each of two distinct systems of controls. One of these I shall call control of purposing, the other control of mechanisms. In the past we have been dealing with these two forms of control blindly and unintelligently. I believe the time has come when the contributions of measurement to our knowledge of the effects of teaching make it possible to organize our experiences, systematize our planning, and achieve results more efficiently because efforts are directed more definitely and more intelligently toward the goals to be attained. Illustrations will make clear the distinctions inherent in these two new terms.

A man's purposes not only differ from a child's, but he has more control over his purposing. The man weighs purposes in terms of meanings or results to be brought to pass a long time in the future. A child's purposes are more in terms of immediate achievements. The purposes of both the child and the man are built out of the same inborn tendencies to action, but the life of an intelligent, well-educated man is determined much more largely than that of the child by his conscious choice of purposes and his conscious organization of experience in terms of his purposes. Therefore, one function of school training should be to give a child (1) experience in purposing, (2) guidance in the selection of worthy purposes, and (3) development of intelligent control over his purposing. In the past this phase of education has been largely neglected.

Mere purposing without achievement is futile daydreaming. For efficient citizenship, as well as for the happiness of the individual, there must be the development of essential mechanisms by which purposes are turned into achievement and of efficient control over these mechanisms. Many a man means well but is actually a failure because he lacks either the essential mechanisms or the necessary control over the achievement skills by which these mechanisms are used to transform his daydreams into reality.

From the beginning schoolmen have recognized the value of mechanisms; hence the emphasis on the three R's. Reading, writing, and arithmetic are primarily the mechanisms by which purposes are achieved. But they are more than this. For it is through the use of mechanisms that new purposes arise. In popular think-

ing, reading, writing, and arithmetic are also fields of purposing, but to school men they have often been conceived only as a field for the building up of mechanisms. Hence the confusion which arises when we attempt to define or measure reading.

Sometimes our attention is directed to "getting the thought" or the purposeful aspect of reading and sometimes towards the development of reading habits or of the control of the mechanism by which the thought is obtained. The Thorndike-McCall reading test is so constructed that the thing measured is the ability of the pupil to use reading for a specific purpose. In my reading test on the other hand, the plan of construction adopted purposely reduces this "use" element to a minimum in order to measure the degree of control exercised by the child over the reading mechanism. An intelligent child, with poor habits of eye movement and much inner speech, will make a high score in the McCall test in spite of his poor reading mechanism, but my test will show up the presence of his defect by low scores for rate. On the other hand a child with perfect control over the reading mechanism but little intelligence will make a low score in McCall's test but a high score in mine. Evidently reading ability needs definition from this point of view and I suggest the following terms.

When the individual is dominated by no purpose or set other than that of getting a general impression of the content presented in the matter read, I suggest that we call his performance observational reading. The traveler waiting in a Pullman at a station and idly reading the signs on a nearby billboard, a man settling down to a comfortable reading of the Sunday paper, a girl reading a novel for pleasure, a child taking the Ayres-Burgess test as most children take it are all examples of this type. I have elsewhere defined it as reading to get the essential relations between the essential elements.

It must be said, of course, that in actual life pure observational reading never occurs apart from some degree of purposeful reading, that the reading mechanism is never operated as a mechanism apart from purpose. On the other hand, so great is the emphasis placed upon developing mechanisms and control of mechanisms that we have children who can read aloud fluently material of whose content they have little understanding.

A still more striking case of the operation of the reading mechanism as a mechanism apart from purpose is found in the

experience we have all had of reaching the bottom of the page only to find that while our eyes had been diligently seeing the words, our brain consistently reporting the association and ideas related to these symbols, our conscious mental self had been attending to something else. In other words there was in operation a psychological complex of intricate habits coordinated and integrated into a process we call reading. It is to this integrated entity that I wish to apply the word mechanism. In observational reading, the self sets this mechanism at work, then stands idly by watching the moving picture of ideas which the mechanism brings to conscious attention.

Observational reading is characterized by openness of mind, by a passive attitude toward what is read. In observational reading little attention is paid to precision of understanding. It is reading for general impression and emotional response. The amount and quality of the reading is determined almost wholly by the skill of the reader; that is, by the degree of control the child has over the mechanics of reading. Of two children of equal capacity, maturity, and training, the slower reader will be found to have established less efficient basic mechanical habits.

The second type of reading I suggest should be called selective or analytical reading and I distinguish two forms, (1) scanning or superficial reading, and (2) study or intensive reading. Both are characterized by the use of the reading mechanism for a specific purpose. Attention is paid only to certain elements of the situation, those elements being determined by the reader's purpose. In the language of Thorndike's psychology, certain bonds are made ready to act by the reader's set; all bonds which are not pertinent to the set are made unready. Thus a proof reader becomes sensitive to errors and sees little else, the politician who made a speech last night responds to the one article in his paper which gives an account of the meeting, the teacher of English reading the same article may see only the faulty syntax.

In all reading of this type there is carried on simultaneously an inner critical or selective process into which reading enters as one element only. Consequently any score based upon the total situation may be determined more largely by this new organization of thought processes than by the skill in controlling the reading mechanism.

My thesis is that since there are many different types of reading situations, and it is necessary to restrict the term reading to one of them, the term should be used to connote the simplest form of the reading activity, namely, observational reading. In other words, reading to me means the degree of control possessed by the child over the reading mechanism, or the excellence of the mechanism itself.

Many will immediately ask, "Is not most reading in life for some purpose? Should we not rather restrict the term reading to selective reading and devise a new term to mean skill in the controlling mechanism of the process?"

There is no escaping the fact that most reading in life is more or less selective in character. A man picks up the morning paper and scans it hastily to find an article on an important matter in which he was interested. In doing so he is carrying on a reading process of a very specific type. Finding the article, he begins to read it leisurely, using a different form of the reading process. Coming across an item of utmost importance to him he begins to study it, taking notes, generalizing, summarizing, and using still another type of reading ability. Finding that the time is flying, he deliberately and carefully scans the rest of the article using still a different type of ability. Now, so far as my experience goes—which is not very far, I admit—if the man has faulty habits of eye movements, that defect will handicap all his reading; and if by remedial training we help him to establish better habits or in other words if we improve the mechanism, all his other reading abilities will be benefited. How generally this is true I do not know. I do know it is true in certain cases.

There is another reason why I think the term reading should be restricted to skill in the mechanics of reading. I am reading this paper, you are listening. Listening means carrying on a certain complex, critical process simultaneously with hearing the spoken word. Would you describe the process you are now carrying on as reading? It is almost identical with the process you would carry on if you were reading this paper silently and preparing to pass judgment on its truth or falsity.

My point is that it will help to clarify the classroom situation if we restrict the term reading to exercises designed to develop either the reading mechanism or control over the mechanism, and then proceed to develop other names, other exercises, and

appropriate tests for the various complex situations in which reading skill is used as a means to an end. Scanning, proof reading, summarizing, studying would then convey the idea that while reading was involved in these processes the training to be given should be directed towards gaining control over mental processes other than the reading mechanism.

Consider for example reading and studying. One ability involved is the breaking of the content read into constituent elements. A second ability is that of recalling out of one's past experience those which are pertinent to the different elements to give them a full, rich content. A third ability is the determination of the character and degree of relationships between the elements. A fourth is the manipulation of the elements to achieve a desired end which may be organization, judgment, memorization, or what not.

The child who has little ability to study needs to be trained in purposing first of all. If he still has difficulty, he may need training in the control of the reading mechanism. If this is not the difficulty he may need training in some one of the other forms of mental activity listed. Training in analytical thinking is not called reading when it is associated with hearing, or with sawing and hammering. Why should it be called reading just because the particular tools employed are printed symbols? The degree of excellence in analytical thinking attained by any individual will be a direct function of his general intelligence and not of his skill in the mechanics of reading. That is my explanation of the high correlation which McCall's reading test has with scores in intelligence tests. It measures not reading ability in general, but one form of ability to study. This in no way detracts from its value as a test, but limits its value as a diagnostic instrument in determining whether or not a child had adequate control over the reading mechanism.

The child who makes a high score in my test and a low score in McCall's may need to be given a series of life experiences rather than a series of reading experiences. To call McCall's a reading test is to imply that the child's deficiency can be made up by practice in reading. This is not true. The person who lacks basic experiences can never have those experiences given him by any form of reading. Herein lies the source of much confusion of thought and much waste of effort. My plea is that the term reading be

applied to that which can be developed exclusively by reading, namely, control of the reading habit as indicated by the ability to carry on easily and with pleasure observational reading. Analytical thinking, selection, judgment may be developed by reading for a purpose, but they may also be developed by many other forms of activity

I wish to close by calling your attention to the fact that the reading exercises reported by Miss Heller and me in the yearbook are an attempt to put this analysis to practical use in the classroom. The basic idea in these exercises is that reading should be taught not as an end in itself, but as a means to an end. We have under way a series of self-help practice exercises by which the child may teach himself to read.[3] I should prefer to call them exercises in purposing. Our preliminary experiments tend to show that they are remarkably effective. Next year I shall hope to present measures of their comparative effectiveness both in giving the child control of the reading mechanism, and in developing control over purposing.

[3] Courtis Standard Practice Tests in Reading. World Book Company, Yonkers, New York.

HISTORY IN POETRY

SUE HUTCHISON DODD

History curricula have usually been determined by the judgment of specialists in History. Recently, however, investigations[1] have been made to determine what the teaching content would be if determined upon the basis of the different functions it might serve. The determination of history curricula in this manner involves many difficulties. The present study has to do with those met in determining the specific historical references contained in the 118 English poems required for entrance to the University of Illinois in 1918. The term "specific references" as used in this study means dates, institutions, persons, places, and written productions.

Our first plan was to consider the historical references in each word and phrase, but obviously such a plan would involve a study of the etymology of each word and the connotations which have grown up around it. It would be difficult, for example, to determine what historical flavors and fragments of information are connoted in the phrase "ivy-mantled tower" in Gray's lines "In yonder ivy-mantled tower, the moping owl does to the moon complain."

Important as such a study would be, it was discarded because of practical difficulties; and the plan of collecting only specific references was decided upon.

The classification of the items was developmental, growing as the study progressed; rather than systematic, following an accepted expert classification. The classes finally arrived at were the following: character, event, place, social class, symbol, institution, date, document, people, principle, and established fact.

The first problem faced in the collection of specific references concerned that portion of history included in the thoughts, feelings, resolutions, beliefs, and customs of the individual characters

[1] Bagley, W. C. "The determination of minimum essentials in elementary geography and history" *Fourteenth Yearbook of the National Society for the Study of Education, Part I;* "Possible defects in the present content of American history as taught in the schools" reported in the *Sixteenth Yearbook, Part I,* by Professor Ernest Horn; "Historical information essential for the intelligent understanding of civic problems" reported in the *Seventeenth Yearbook, Part I,* by Professor B. B. Bassett.

and of the peoples treated in the selections. These necessarily escaped enumeration save as they were outwardly expressed in an event, document, principle, or institution. The lyrics and the drama are rich in feeling, but none of this feeling adheres to the specific references. Furthermore, historical references frequently lose their significance when taken out of their setting in a poem. In addition, literary references are likely to be distorted as historical facts. These problems were not solved.

A second problem was that of scoring. A quotation of fifteen lines from "Alexander's Feast" will facilitate the discussion:

'Twas at the royal feast for Persia won
By Phillip's warlike son;
Aloft in awful state
The godlike hero sate
On his imperial throne;
His valiant peers were placed around,
Their brows with myrtle and with roses crown'd,
(So should desert in arms be crowned),
The lovely Thais, by his side
Sate like a blooming eastern bride
In flower of youth and beauty's pride:—
Happy, happy, happy pair!
None but the brave,
None but the brave,
None but the brave deserve the fair.

Here it would for instance be impracticable to score all references to *Alexander*. There are eight such references, including the title, as follows: *Alexander; Philip's warlike son; hero; his* (three times); *pair* (distributed as references to Alexander and Thais); and possibly, *brave*.

It is quite evident, however, that in their bearing on the importance of knowing about Alexander such references have one meaning if derived from eight different poems and an entirely different meaning if derived from fifteen lines of one poem. In the former case Alexander would be a character referred to frequently in literature; in the latter, only once, though frequently on that occasion. This line of reasoning led to the decision to score characters, places, dates, institutions, and written productions only once for each selection.

A third problem was connected with the scoring of dates,—for example, the disposal of *Written in Early Spring* and *St.*

Cecelia's Day, 1687. The first was discarded because it was not a specific reference to a date and the second was included because it was specific. So, also, were discarded for the same reason: *December*, *Christmas*, *Martian Kalends*, and *Marathon Day*, in the "Battle of Lake Regillus." Dates appearing in the titles of poems were included while dates showing the year of publication were omitted.

Only twelve dates appeared in the 118 poems. These were *Marathon Day, 490 B. C.*, in "Browning's Pheidippides"; *St. Cecelia's Day, Nov. 22, 1687*, in Browning's "A Song of St. Cecelia's Day"; *Drummossie Day, April 16, 1746*, in Burns' "Lament for Culloden"; *1692* and *May 31, 1692*, in Browning's "Hervé Riel"; *1746* in Collins' "Ode written in MDCCXLVI"; *1802* in Wordsworth's "England and Switzerland, 1802"; *1802* in Wordsworth's "London MDCCCII"; *September 3, 1802*, in Wordsworth's "Upon Westminster Bridge, Sept. 3, 1802"; *1803* in Wordsworth's "Yarrow Unvisited, 1803"; *1803* in Wordsworth's "Composed at Neidpath Castle, 1803"; and *September, 1814*, in Wordsworth's "Yarrow Unvisited."

A fourth problem grew out of the collection and classification of references to institutions. Here institutions were regarded as certain persistent, collective ideas of a people, which find expression in organization of a political, religious, educational, or industrial nature. While institutions tend to be political, religious, educational, or industrial, the differentiation cannot always be clearly made. In the "Lays of Ancient Rome," "The Iliad," and "The Odyssey," each phase of institutional life is clearly tied up with all the other phases. This lack of separation made it extremely difficult to collect references to institutions.

England and *Switzerland* in "England and Switzerland, 1802" are references to political institutions; as are also *King* of Scotland, *Roman Senate*, *Duke* of Venice, references to the machinery of government applied to particular instances. References to religious institutions and practices are such as *Mother Church*, in "The Lady of the Lake," as, *Consulting Taghairm* (Augury of the Hide), *Waving the Fiery Cross*. Here also belong references to the machinery of the church, as *Archbishop* in "Up at a Villa—Down in a City." A reference to an educational institution is *Eton College* in "An Ode on the Distant Prospect of Eton College," and the reference to the *schoolmaster* in "Snowbound." Similarly,

the *ploughman* in Gray's "Elegy" is illustrative of a reference to an industrial institution.

A fifth problem arose in connection with specific references to persons, including references to individuals and peoples. The characters fell naturally into four groups: historical, Biblical, legendary, and mythical, with shadowy lines between each group. Historical characters were considered to be those appearing in "The Century Cyclopedia of Names" and Brewer's "The Reader's Handbook," or those whose actual existence was affirmed in the editorial or textual exposition of the author's writings found in special editions. To be tabulated as an historical character the person must have actually lived and must have a definite record in addition to that made in the poem. References in Wordsworth's "La Belle Dame Sans Merci" were not included because only specific names or designations capable of specific identification were to be listed. For the same reason *doctor*, *sergeant*, and others in "Macbeth" were exluded from consideration. Similar action was taken in the case of common nouns, such as *peers* in "Alexander's Feast." Where different names for the same person were used, they were included if they carried different connotations, as, *Macbeth*, *Thane of Cawder*, and *King of Scotland*. Names of authors of poems were not included unless they appeared within the poems. Personal references by pronouns were not included.

One hundred and twenty-seven different characters appear in the 118 poems. Of these a number occur more than once, *Alexander*, *Caesar*, *Cromwell*, and *Shakespeare* ranking highest in frequency. These characters represent twelve different nationalities. They are distributed as follows:

English, 27.—Bariffe, Sir George Beaumont, Princess Charlotte, George Chapman, Oliver Cromwell, John Dryden, Queen Elizabeth, King Edward, Thomas Ellwood, Arthur Golding, John Hampden, Childe Harold (Lord Byron), Samuel Johnson, Kempenfelt, Milton, Thomas Otway, Henry Hotspur Percy, Lord Queensberry, Radcliffe, Shakespeare, Shelley, Siward, Hugh Standish, Ralph Standish, Thurston de Standish, Wat Tyler, Wordsworth.

American (including Indian), 23. John Alden, Aspinet, Chalkley, Corbitant, George Haskell, Stephen Hopkins, Merdy E. Hussey, Harriet Livermore, Priscilla Mullins, Sanroset, Wm. Sewel, Squanto, Miles Standish, Rose Standish, Tohamahamon, Mrs. Mercy Warren, Richard Warren, George Washington, Mrs. Whittier, Moses Whittier, Elizabeth Whittier, Miss Whittier, Gilbert Winslow.

Scotch, 17.—Jean Armour, Burns, Mary Campbell, William Douglas, Ellen Douglas, James Douglas, King Duncan, James V, Lisley, Macbeth, Lady Macbeth, Macdonald, Malcolm, Queen Mary, Mary Morrison, Walter Scott, Earl of Douglas III.

Roman, 17.—Mark Antony, Brutus, Caesar, Saint Cecilia, Cicero, Cornelia, Hadrian, Horace, St. Jerome, Livy, Cecilia Metella, Pompey, Publius Scipio, Lucius Sulla, Titus, Trojan, Virgil.

Italian, 15.—Vitori Alfieri, Alfonso II, Michael Angelo, Ludovico, Ariosto, Boccaccio, Dandolo, Dante, Doria, Laura, Pope Gregory, Machiavelli, Petrarch, Rienzi, Tasso.

French, 10.—Belle Aurore, Boileau, John Calvin, Charles V, Louis XIV, Saint Francois, Jean Francois, Jean Lennes, Napoleon, Herve Riel, Tourville.

Macedonian, 4.—Alexander, Philip, Timotheus, Thais.

Greek, 5.—Apollonius, Homer, Miltiades, Pheidippides. Plato.

Persian, 3.—Darius, Rustum, Sohrab.

Swiss, 2.—Queen Bertha, Francois Bonivard.

Spanish, 1.—Cortez.

Egyptian, 1.—Cleopatra.

Twenty Biblical characters are named. Without reference to frequency of mention these are:

Abraham, Amun, Ataroth, Baal, Bathsheba, Beelzebub, Boaz, Cain, Christ, David, Eve, God, Goliath, Isaac, John, Mary, Og, Paul, Rebecca, and Satan.

Under Historical peoples are included references to those not now in existence as well as to those now existing. They include references to clan, as *Clan Alpine;* references to line of descent as *House of Beaudesert* and *House of Tullibardine;* references to family group as *Douglas and Graeme;* references to religious groups as *Druids, Hebrews-Jews, Christian* (and under the last caption may be classified *Franciscans, Pilgrim, Puritan,* and *Quaker*); references to tribe as *Cherokees, Creeks;* references to groups by nickname as *Yankee, Highland,* and *Lowland;* references to city-state groups as *Athenian, Carthaginian, Lydian, Spartan, Theban,* and *Venetian;* references to races and nationalities as *Aeolian, Angles, Arabian, Austrian, Breton, Celtic, Dacian, Dardon, English, Ephesians, Etruscan, Etrurian, Flemish, French, Gallic, German, Gothic, Grecian, Greeks, Hebrides, Hebrews-Jews, Italians, Indian, Latian, Normans, Persians, Romans, Scottish, Spanish, Trojans,* and *Turks.* In the collection of references to historical peoples, the principle was established of including proper adjectives appearing in such expressions as *Arabic* letters, and *Lydian* measures.

References to persons in "The Lays of Ancient Rome" were, upon expert advice, not included among historical characters. Legendary characters, human beings about whose actual existence there is no authentic record (*Robin Hood*) and mythological characters, superhuman beings conceived of as possessing divine characteristics (*Apollo*) were not included.

With respect to the collection of references to places, difficulties appeared in the differentiation between merely geographical expressions and those of an historical character. A case in point is that of *Persia* in the first line of "Alexander's Feast." Persia, of course, is a geographical expression of the present day, but in addition it is a historical place in the sense in which the term "place" is used in this study because associated in this poem with important historical events.

Nine references to written productions were found: Bariffe's "Artillery Guide," Goldinge's "Commentaries of Caesar," the Bible, the One Hundredth Psalm, and Proverbs in the "Courtship of Miles Standish"; "Chalkley's Journal," Sewell's "History of the Quakers," and "Arabian Nights" in "Snowbound"; and Chapman's "Homer" in "On First Looking into Chapman's 'Homer.'"

It will be observed that the number of historical references in these poems is relatively small. We have, however, from a broad point of view secured but a part of their historical material. Our methods may be summarized as involving the following program:

1. To score only once each reference of a kind in a given poem.
2. To collect only specific references to date, institution, person, place, and written production.
3. To regard as historical only those references to dates that are specific and definite in point of year.
4. To collect references to political, religious, educational, industrial, and social institutions that were not running in 1900.
5. To regard as historical only those references to persons, meaning both character and people, who have actually lived, and of whom we have a definite record in addition to the poem in which mention is made.
6. To regard as historical only those references to place that are associated with an historical event and character.

7. To collect only references to written productions contained within the poems.

8. To include all historical references to date, institution, person, place, and written production, that are unmistakably implied but not directly mentioned.

9. To include all designations for the same person or people, which carry different connotation.

10. To include references to historical character regardless of treatment by poet.

Obviously, this method of determining historical content involves a great expenditure of time and labor. The questions naturally follow, is this necessary? Of what practical value are the findings? A list of the historical findings in English poetry is of practical value to both the teacher of English and the teacher of History. While a history curriculum can not, of course, be worked out on the basis of historical references in poetry alone nor even on the basis of such references in both the poetry and prose, read in the High School, a study of these references will aid in coordinating more satisfactorily the history curriculum with other things which the student is expected to learn in his High School course.

The use of scientific methods is imperative to avoid the overlapping of curricula in history and allied branches, and in order to determine what historical data should be taught. Clearly, a pupil should be taught the history that he will have most occasion to use, and it is only through the use of scientific methods that we can learn what it is. Similar methods may be employed to advantage in working out the historical references to the prose literature taught in the high school. Through such studies a more effective coordination of history and literature may be accomplished, time saved through elimination of unnecessary duplication, and better history curricula obtained.

INVESTIGATIONS UNDERTAKEN BY THE SOCIETY FOR EXPERIMENTAL PEDAGOGY IN DENMARK[1]

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No foreign correspondent with whom we have come in contact has expressed a more sincere admiration for the work which is being done in America in educational research than has Professor Tybjerg of Copenhagen, Denmark. He is—or was when we last heard from him—President of the Danish Society for Experimental Pedagogy. For this reason as well as for other reasons, he is especially well qualified to speak on educational activities in Denmark. He has written this article at our request. EDITOR.

I wish to thank you for the opportunity of expressing myself in your distinguished journal concerning the work in experimental pedagogy here. I read the JOURNAL OF EDUCATIONAL RESEARCH with the greatest interest, and it always comes as a welcome guest. I am also grateful for the many excellent ideas which the American workers in experimental education are dispensing so lavishly; and as I recently expressed it at the "School Meeting of the North" in Christiana, I consider America the leading country of the world in this field.

As to the work we are doing, our society, the Society for Experimental Pedagogy, was founded seven years ago; and during the time it has existed it has undertaken a number of investigations, both of a physical and of a psychological nature. I shall mention these investigations briefly.

RETENTION AND REACTION IN RELATION TO MENTALITY

One of the first of these was conducted by Dr. R. H. Pedersen. The problem was to determine the difference between the ability of normally gifted children and children of inferior intelligence in retaining impressions. In the experiments visual and phonetic impressions were used. For the visual impressions figures were chosen which were constructed according to a simple principle that had been indicated by Professor Alfred Lehmann. From a

[1] We desire to express our appreciation to Doctor Harold M. Westergaard of the University of Illinois for translating Professor Tybjerg's article.

straight line, lines extend with even spacing; these lines are either perpendicular to the straight line, or they make an angle with it of 45°. In this manner a great number of figures are formed which are all different but which are, nevertheless, so much alike that they are about equally difficult to retain in the memory. In the experiment, series of one-placed numbers were also used, each series consisting of eight terms.

Results.—The children in the regular school showed decided superiority in retaining series of numbers. Then follow the children in the auxiliary school (children of inferior intelligence) and finally, the children of the Vaerneskole (children with the lowest intelligence), although the latter are a little older. As to retaining of geometric figures, the children of the regular school take first rank; but the children of the Vaerneskole are better than those of the auxiliary school. This result is due, of course, to the fact that the children in the Vaerneskole are trained more in visual representation; in other words, to the fact that the training in the Vaerneskole is to a decided degree based on visualization. The girls are considerably below the boys in retaining geometric figures, and among adults women have also been found to be inferior to men in this respect. The result of some tests of reaction was that the children of inferior intelligence reacted much more slowly than those of good intelligence. In all kinds of mechanical work depending on speed, they also fell behind those of normal intelligence. The girls reacted more quickly than the boys.

The Ideals of Children

This investigation was conducted by Professor Alfred Lehmann. The children investigated numbered 4,600. All classes of the community were well represented. In an investigation of this sort the motives stated should be emphasized in particular.

Results.—Interests in one's personal acquaintances decreases as age increases, and does so more decidedly for boys than for girls. Besides, the curve for the boys is far more regular, a condition which showed itself in almost all the investigations. On the other hand, interest in historical personalities increases with age. Boys more frequently chose the father as their ideal (person to imitate), girls more frequently the mother. This result is most pronounced in the country, where not a single girl chose the father

as her ideal. Women of history are hardly ever chosen by the boys, but frequently by the girls. The girls more frequently choose persons in Bible history as their ideals. Only a few ideals are taken from poetic works. The dreams of boys about great deeds culminate at the age of fourteen years. From that time on the interest in warriors decreases rapidly while the interest in peaceful occupations progresses accordingly. Girls lack almost completely interest in peculiar masculine deeds. The children of the middle school[2] are far superior to the other children as regards historical interest, in particular at the ages of fifteen and sixteen. Girls more frequently emphasize the looks of their ideals than do boys. Physical abilities and definite positions in life are of more importance to the boys than to the girls. Interest in intellectual ability increases with age. Boys and girls progress at about the same rate until the age of twelve years. During the three following years the girls stand still, but they reach the level of the boys at the age of sixteen.

In respect to motivation, consideration for one's self decreases with age, while general kindness—that is, consideration for others—increases rapidly with age in the case of girls and with remarkable regularity. Boys on the other hand, are not much concerned with general kindness. The motive of fame is mentioned so rarely by the girls that we may leave it out of consideration entirely. Courage, however, is mentioned somewhat more frequently but not as frequently as in the case of boys. Thus we see that for boys and girls two distinct instincts predominate—the feminine instinct for protection and the masculine instinct for fight. In his further investigations Professor Lehmann reaches the conclusion that the coeducational school tends to reduce these differences.

Spare Time Reading of Children

This investigation was undertaken by School Superintendent Huno. About four thousand children were investigated. They were to tell what two books they liked best, and they were also to state what other books or periodicals they read.

Results.—No single book or author obtained a very large number of votes, Robinson Crusoe for 6.4 percent. Cooper is one of the

[2] The middle school has four grades extending from about the twelfth to the sixteenth years. It prepares for higher educational careers.

most favored authors. His books satisfy the warlike instincts of the eleven- and twelve-year-old boys. The interest in fairy tales decreases with age. It is the books with warlike subjects which dominate for the boys. Between the ages of nine and thirteen years these books represent one-half of the preferred list. During the ages of eleven and twelve years, the instinct for fight reaches its greatest intensity, but not until the age of fourteen is there a decided decrease. The line of development runs as follows: from the world of fairy tales through the instinctive desire for fight, where interest moves from the primitive blood-and-thunder fight to the historical forms of war. In the last we reach the condition of the young man who has found his place in the civilization of modern times.

The children of the provinces (the part of Denmark outside Copenhagen) lag behind. They retain for a long time an interest in childish books. The children of the middle school soon get through with Cooper. Boys have a decided contempt for girls' books but girls to some extent read books for boys. For example, 12 percent of the girls chose books on warlike subjects. The most pronounced sentiment is tenderness (kindness, sympathy); and this sentiment rather soon becomes identified with interest in innocent love stories. Girls read fewer books than boys, but their list is more varied. They have more interest than boys in poetry and less in non-fiction.

Physical Condition of Children and the Effect of the Summer Vacation

This investigation included about a thousand children. It was conducted by Dr. R. H. Pedersen. The children were weighed every two weeks, when they had bathed, from the beginning of May until the end of December. In addition to the weighing every two weeks, tests were made of their muscular strength by means of a dynamometer constructed by Professor Alfred Lehmann. This consisted of a spring with a handle, the spring being placed on a board. On this board a transverse piece was placed to support the hand. In each test five pulls were made.

Results.—The children of the middle school had the greatest weight. They weighed on the average two kilograms more than the children of the elementary school. The children of the Vaerneskole (children of the lowest intelligence) weighed the least,

but the relation was not the same in all age groups. The youngest children in the Vaerneskole had the same weight as children in the elementary school, but the children of more than 9½ years weighed less. As to height, the children in the middle school were ahead of the others. On the average they were 2.3 centimeters taller than the children of the ground school.

Concerning the benefit of the vacation the following facts were observed. The younger children when at home during vacation increased 0.54 kilograms in weight; when they were in the country three or four weeks, they increased 0.74 kilograms; and when they were in the country five or six weeks, they increased 0.87 kilograms.

The older children at home showed an increase of 0.97 kilograms. If they were in the country three to four weeks, the increase was 1.04 kilograms. A period of five to six weeks in the country produced an increase of 1.01 kilograms. The children who had jobs increased more in weight than those who did not have jobs, perhaps because their physical processes (circulation) took place more quickly, and they had an opportunity to get better food.

Intelligence and Number of Children

The following three investigations were undertaken by the writer. In the school with which I am connected there are in all twelve hundred children. The children are placed in the classes according to ability—that is, they are arranged in the classrooms according to their marks in the school subjects. As a rule the same teacher follows the children from the first grade to the seventh or eighth grade. Thus, the teacher obtains an excellent knowledge of the children. Now, if the children in each class are divided according to ability into first, second, and third sections, and if one investigates how many brothers and sisters the children have, the following results are obtained. In the first section of the elementary school we find 328 families with 1,355 children, the average being 4.13 children per family. In the second section of the same school there are 322 families with 1,476 children, giving an average of 4.45 children per family. In the third section there are 321 families with 1,599 children; the resulting average is 4.98 children per family. In the auxiliary school 173 families were represented. The total number of chil-

dren in this case was 941, and the average was 5.44 children in a family. In the Vaerneskole (for those of lowest intelligence) there were children from 189 families; the total was 833, and the average 4.41 children per family. As seen by the figures there is an increase in the number of children per family from the first section (that of the most intelligent children) to the school for children of inferior intelligence (the auxiliary school). In the Vaerneskole, however, where the children have the lowest mentality, the average number of children per family is again lower. The explanation probably is that many of these families have so far degenerated that they are about to die out.

I have reached the same conclusion—namely, that in general those of low intelligence propagate the most rapidly—by investigating all the children from 500 families with reference to their standing in school. When the results are put together, they stand as follows, each figure representing the average number of children per family:

	Average Number of Children	
	First Investigation	Second Investigation
Families of children of normal intelligence (first and second sections in the above classification).	4.29	4.4
Families of children of inferior intelligence (third section and auxiliary school).	5.14	5.4
Auxiliary school alone.	5.44	.....

The conclusion is that people of low intelligence progagate the most rapidly. In many of the very large families children follow regularly with intervals of two years. Those of highest intelligence decrease the number of children in order to be able to maintain the standard of living. The investigation showed that there is great uniformity in the intelligence of children within the same family, although it sometimes happens that a stupid individual is found in an intelligent family and *vice versa*. The families of skilled laborers have more intelligent children than the families of unskilled laborers.

Periodic Changes in the Health of Children

The material was obtained by investigating children who had entered school during six different years. The school had an enrollment of twelve hundred children.

Results.—There is a decrease in the amount of sickness from the first grade (the youngest) to the third (children of nine or ten years). Then the curve of sickness increases until the sixth grade is reached, decreasing from this point through the seventh grade. Girls have a greater number of days of sickness than boys. The children of the auxiliary school (children of low intelligence) have a greater number of days of sickness than those of normal intelligence. The girls of the auxiliary school have the greatest amount of sickness of all the school children; and in general the children of this school reach the minimum of sickliness later than the other children. During the year there is an increase from April to July. During August (the month of vacation) the minimum is reached. The amount of sickness then increases during the fall and reaches its maximum during the winter in February. The small children, particularly the small girls, show greater oscillations in the amount of sickness, that is, they are influenced more by the seasons.

An Investigation of Children under Council Supervision

Children under council supervision are criminal or morally corrupt. From the results obtained by investigating seven hundred children it was found that the critical age—that is, the age during which the greatest number of crimes is committed—is thirteen to fourteen years for the boys, and fifteen to seventeen years for the girls. Ninety-four percent of the crimes of the boys consist of theft alone. In the case of the girls 39 percent of the crimes consist of theft alone, 28 percent of theft and immorality together, and 27 percent of immorality alone.

The distribution of these seven hundred children with respect to intelligence and industry is given by the following percents. Intelligence: excellent 1.20, good 16.54, medium 8.64, ordinary 8.66, fair 14.76, poor 50.20. Industry: very industrious 1.16, industrious 17.05, fairly industrious 7.75, lazy 74.04.

Editorials

PROMOTION RATES

Promotion rates are computed in various ways which render it difficult either to make comparisons between them or to make accurate statements about them. Three methods have been particularly in vogue: first, the method of expressing the proportion which the number of children promoted on the last day of the year (or term) bears to the total membership on that day; second, the proportion which the sum of the incidental promotions throughout the year (term) and the number of promotions made on the last day bears to the membership on that day; and third, the proportion which the sum of the incidental and end-of-year promotions bears to the membership on that day when likewise increased by the number of incidental promotions.

The first of these methods is the one most commonly used. Its chief defects are, (a) that it takes no account of incidental promotions, and (b) that it represents the school as equally responsible for advancing every pupil on register on the last day of the year or term. Manifestly, both these defects are serious.

As to the first one, every modern school is trying to develop flexibility of promotion. It is trying to offer to every child the opportunity for advancement as soon as it becomes apparent that he deserves it. In such schools it is recognized that fitness for the next higher grade may be acquired at any time during the year and that to afford but one opportunity for promotion is to make it impossible to adjust the school to the child in any but the crudest way. A slogan for such schools would be, "Every day is promotion day."

The second defect of the first method is likewise serious—the defect in virtue of which the school is made equally responsible for the advancement of every child who happens to be on register on a certain day. It is clear that no such equality of responsibility exists. The child who is on register on the last day of the year may have been a member of his grade but a single

day; or he may have been a member of it an entire year. Indeed, if he is a repeater, he will have been a member of the grade in question for more than a year.

The second method takes account of the incidental promotions; but, like the first method, it bases the rate of promotion merely on the end-term membership, thus again tacitly assuming that every child is equally deserving of advancement. Moreover, according to the second method the dividend in the computation may be, and often is, greater than the divisor. Under these circumstances we obtain a percent of promotion in excess of one hundred. Thus, this method while avoiding one of the defects of the first method does so by introducing another; and it fails altogether to avoid the second defect.

The third method, which consists of adding the incidental promotions to both the number promoted on the last day and the number on register on that day, is obviously an attempt to prevent the percents as computed by the second method from exceeding one hundred. This, however, is its only virtue—and that virtue is a vice, because it is obtained by unwarranted means. For example, to add (as is done in the divisor) promoted pupils to pupils on register is to produce an impossible statistical hybrid.

The devising of a valid method for computing promotion rates is suggested as an important research problem. No one seems to have appreciated the seriousness of the condition under which we labor. The fact is that the school has no defensible method at its command by which to record its success in adjusting itself to the needs of the pupils. No one knows what the responsibility of the school is in this regard. No clear case has been made out by anybody to show what should be its total maximum service to the community in regard to promotion—a service which should be statistically represented by one hundred percent. There are those who assert that this maximum service is rendered when every child is promoted. But surely this does not mean that a child who has been in attendance but a day or a week or a month prior to the regular cataclysm at the end of the year or term should be catapulted into the next grade. The problem is exceedingly complex; and before we can determine upon a method of computing promotion rates, we must know and be able to express numerically what the maximum promotion rate (one hundred percent) means.

Moreover, there is little appreciation of the importance of the promotion rate as indicating the chance which a child has to be influenced by the curriculums of the higher grades. Indeed, in our thinking of what constitutes a good school we do not habitually regard the promotion rate as an important element. Yet it is certain that few measures would more accurately reflect the service of the school to the community than would a properly computed promotion rate.

Let us consider an artificially simplified situation. Suppose that a thousand pupils entered the first grade last September in a school system in which the prevailing promotion rate was eighty percent. Consider that none of these thousand pupils will withdraw from school this year—i.e., that all will remain until "promotion day" next June. It is clear that if under these circumstances a promotion rate of eighty percent is applied to these children, eight hundred will enter the second grade next year. There they will join some repeaters; but let us center our attention upon the eight hundred. If we assume that no withdrawals take place during the second year, the promotion rate of eighty percent will reduce the 800 to 640 upon entrance to the third grade.

If we similarly consider grade by grade the survivors of the original one thousand children, we shall find that only 168 of them will be graduated from the elementary school on time—i.e., in eight years. This is truly an astonishing result. We do not mean that, with a promotion rate of eighty percent, only 168 out of a thousand entering pupils will be graduated. Some of them will be graduated in nine years and still others in ten; perhaps some will be graduated in less than eight years. Nor do we mean to say that a promotion rate of eighty percent will have precisely this effect even with reference to on-time graduates, because in any given grade there are both repeaters and pupils promoted from the lower grade on the last promotion day, and because the general promotion rate—derived as it is from all these pupils taken together—may not be the actual promotion rate for each of these two types of children. Our statement is that if one thousand pupils enter the first grade, and if to them and their successive survivors (no promoted pupils dropping out) an eighty percent promotion rate is applied, only 168 will be graduated in eight years.

If, however, a ninety percent rate prevails, the figure corresponding to 168 will be 430. Merely by increasing the promotion rate one-eighth, we may graduate two and a half times as many pupils at the end of eight years. In other words we may more than double the probability that a given child selected at random at the time of beginning school will be graduated on time.

If a rate of ninety-five percent is attained in a school system, 664 of the thousand beginning pupils will be graduated in eight years. This is about four times as many as will have the same chance in a system where a rate of eighty percent prevails.

The reader can verify these figures very easily by taking the proposed rates and applying them eight times beginning with a base of one thousand. One naturally supposes that if the promotion rate is increased from eighty to ninety percent, it only means that ten more children per hundred are promoted. What one fails to apprehend is that this rate is cumulative, that it is not merely applied once but that it makes its deadly assault upon the children eight successive times, and it thus piles up its effects like compound interest—only in the opposite direction.

Is it not worth while to increase the promotion rate just a little in order that such large returns in pupils brought under the influence of the richer curriculums of the higher grades may be realized? Is full service to the community being rendered by the school which—perhaps in the name of maintaining high standards—ruthlessly shuts out from its full benefits the greater part of the pupils who enter its doors?

B. R. B.

THE LATIN INVESTIGATION

Somehow we haven't habitually attributed to teachers of Latin and Greek a decided penchant for new things. We have rather looked upon them as the conservators of our best traditions. Indeed, we have known some of them who were so wedded to the past that their faces did not seem even to be turned toward the light. These, of course, represented the extremists, a fair proportion of whom is to be found in every group. But even the moderate and more liberal of the classical people have been thought of as especially inclined to point out the lessons of the

past. Unusually conclusive evidence has appeared to be required by them before they have been willing to accept new ideas.

The fact, therefore, that a thoroughly modern and remarkably extensive piece of research—with controlled experiments, tests, 'n everything—is being launched by the classicists may mean either of two things, and most probably a little of both. On the one hand, it may indicate that the conventional judgment regarding the attitude of the teacher of the ancient languages toward new ideas is wrong. On the other hand, it may mean that educational research—the modern kind with tests, measurements, and statistics—has proved its case, and that it has done so by the verdict of the conservatives.

Be this as it may, it is a fact that a committee of the American Classical League with the financial backing of the General Education Board is putting on the most progressive, the most fearless, and the most complete program of investigation which has ever been attempted by any group of teachers. The courage of the committee and particularly of the Special Investigators (Doctor Mason D. Gray of Rochester, New York, and Doctor W. L. Carr of Oberlin College) is the more evident when one considers where the money comes from. The publications of the General Education Board have not been characterized by a friendly attitude toward the teaching of the ancient languages. Perhaps this would be denied by the authors of these publications, but it is certain that no classicist would apply to this Board for support in a propaganda to extend the study of Latin and Greek. Under these circumstances one wonders whether this appropriation may not have been made with the belief and possibly with the hope that the results would be in accordance with opinions previously expressed in reports emanating from the General Education Board. In other words, it may have been the intention of the donors to let the classicists hang themselves.

Now, no one is called upon to hang himself merely because he has the opportunity; nor is he called upon even to place himself in jeopardy. The classicists would not therefore have been very vigorously criticized if they had refused to place their necks in proximity to the noose. The fact that they were willing to take whatever risks were involved indicated a high degree of courage. This is, of course, admitting that the attitude of the General

Education Board toward the teaching of Latin is possibly correct and that, accordingly, it may be corroborated by the investigation.

But wouldn't it be interesting if the event should be of a different sort? Suppose, for example, it were found that the study of Latin did, more effectively than any other agency, improve the knowledge and use of English. Suppose it should be scientifically demonstrated that all or the major part of the desirable outcomes claimed for the study of Latin are actually obtained under present conditions or that they are obtainable under conditions which the investigators may set up. And suppose that a report in which such conclusions were reached should be placed in the hands of the General Education Board for publication—for we assume that the Board will reserve to itself the right to publish the report. We wonder whether under these circumstances the officers of the Board would exhibit the same high purpose that now appears to actuate the investigators. In particular, we wonder whether the report would reach the public in the form in which it was written; whether, in other words, the editors would content themselves with a sympathetic treatment of it and limit themselves to allowable editorial functions. The query is not altogether inappropriate, for in connection with the Gary Survey (the report of which was issued by the General Education Board), it has been rather generally believed that the writers were by no means free to express themselves and that this limitation upon their freedom extended not only to form but also to substance.

We offer to our readers on another page a statement concerning this investigation. We urge all research workers and school people not only to be ready to cooperate wherever cooperation is needed, but to be alert to insist that the results of the inquiry shall be impartially reported, that the proponents of Latin shall make no unwarranted claims for it, and that its enemies shall not garble the report in the direction of their desires. We all want to know the extent to which Latin is worthy of our confidence; and we are delighted that a serious attempt is being made to find out. We are grateful not only to the Classical League for accepting the challenge, but to the General Education Board for giving the material support which will make the inquiry possible. And now, just as the investigation is being started, we serve notice upon all and singular the parties thereto that we propose to exercise every

proper prerogative of an interested public to see that the game is played fairly.

We realize the delicate position in which the Special Investigators are placed. On the one hand they are the representatives of the Classical League, either appointed by it or by a committee of it. In everything that they have done or said thus far, they have shown a relentlessly judicial attitude. They are apparently asking no quarter. They appear to be willing to follow the figures wherever they may lead. Whether the Advisory Committee and the influential members of the Classical League are prepared to adopt the same impersonal attitude, especially should the results prove to be unpalatable, is problematical. It is not unthinkable that if the classicists are disappointed in their hopes, they may adopt the tactics of the Turkish sultan whose amiable custom it was to execute the messenger of ill tidings.

On the other hand, the Special Investigators represent the General Education Board with its known proclivities. They will therefore have to prove every point "up to the hilt," especially if the points are favorable to Latin as a high-school subject; and in any event they will have to prepare first-rate reports. For whatever of bias there may be among the officers of the General Education Board on this or any other subject, none will deny the technical excellence of the reports which the Board publishes.

But in the largest and truest sense Messrs. Gray and Carr represent the spirit of inquiry, the genius of research. They are the first teachers of any subject belonging to the secondary or higher curriculum to present a broadly conceived program for the evaluation of the work that as teachers they are doing. If their work as investigators is done, as it undoubtedly will be, in the true research spirit, and if in exemplifying this spirit, they proceed in a workmanlike manner, they will ultimately add something to to the literature of research which under favorable publishing conditions may constitute a classic. The JOURNAL OF EDUCATIONAL RESEARCH wishes the highest and best success to them and to all others throughout the country who are engaged in this hopeful enterprise.

B. R. B.

Reviews and Abstracts

KEITH, J. A. H. and BAGLEY, W. C. *The Nation and the schools.* New York: The Macmillan Company, 1920. 364 pp.

As announced in the subtitle, this book is "a study in the application of the principle of Federal aid to education in the United States." More specifically, it is "a collection of fact and argument designed to show that the Nation is, in a very real sense, an educational unit, that the Federal government should assume a fair proportion of the cost of maintaining schools throughout the country, and that there should be established at Washington an adequate agency through which the educational needs of the Nation *as a Nation* may be made real" (p. 7). In pursuance of this purpose there is presented, first, the historical development in outline of the policy of Federal aid; then comes an analysis of the present situation in the light of the deficiencies revealed by the war, with especial reference to the rural schools and the preparation of teachers; and lastly a discussion, centering on the Smith-Towner bill, of the measures introduced into congress to remedy the situation. The authors present a strong plea in favor of the proposal "to restore the present Federal Bureau of Education to its original status as a Department of the Government, and to make it an executive department with a cabinet officer—a Secretary of Education—at its head" (p. 7).

In the historical part it is shown that, as a matter of fact, the Federal government has always aided education, both by land grants and by grants of money. This policy reaches back more than a century, but at no time has there been any serious thought, on the part of the government, to control public education within the Federal States. The fear that education might become nationalized, in the sense of being dominated by Federal control, has no real basis in fact.

Since the right of the Federal government to support public education has been established by practice, the only remaining consideration is that of expediency. This question likewise has been decided by the course of events. It has become increasingly clear that education is a *National* concern, and that the National interest in education is not adequately cared for under a policy in which the community or the state is the educational unit. The states are independent educationally, as they are commercially and industrially. "If, four years ago, a person could be excusably blind to this essential educational independence of the several states, the time when such blindness is excusable has certainly passed" (p. 320).

Experience has shown that grants of land or money may be used effectively to stimulate the states to greater efforts in meeting educational needs. The money for the purpose can be raised by means of the national income tax—"a method which, in view of the relation of education to the increase and security of wealth, commends itself as eminently fair and right" (p. 322). The creation of a Department of Education is necessary in order to coordinate the various educational activities of the national government, to represent this country in its educational relations with other countries,

to become a national center for educational research, and to furnish leadership in American education. The creation of such a Department would be in line "with what every first-class modern nation except America has already done, and with what the Nation has done in creating Departments of Agriculture, Labor, and Commerce" (p. 323).

Whether or not the reader agrees with the conclusions that are drawn, he is likely to concede that the book is of unusual merit. It is excellently conceived and excellently written. The statements and arguments are backed up with numerous tables and statistics, which, together with the historical *résumé*, are valuable independently of the purpose of the book. The volume is a contribution of note to a fundamental issue in education.

B. H. BODE

Ohio State University

GODDARD, H. H. *Human efficiency and levels of intelligence.* Princeton, New Jersey: Princeton University Press, 1920. 129 pp.

That human beings may be classified into a series of widely divergent groups according to the level of their native intelligence; that these levels correspond to stages in the mental growth of children, which are clearly marked according to the various ages; that individuals below the average intellectual level have been arrested in their mental growth at the age which corresponds to their level; that the individual's intellectual level can be accurately measured by means of tests; that the individual can and should be guided, by compulsion if necessary, into an occupation which demands the level of intelligence which he possesses; that crime, being almost entirely due to deficient intelligence, criminals should be dealt with as defectives; and that the education of persons of different levels should vary greatly in range and character—these are the outstanding contentions set forth in the lectures which are here printed.

The author does not attempt in the space of four lectures to give much of the detailed evidence which lies back of his conclusions. He sketches his pictures with broad strokes and only occasionally fills in the details. In general he represents the extreme view regarding the degree of importance of the level of intelligence as a determining factor in human conduct and efficiency, and regarding the accuracy of our present methods of testing. In the opinion of the reviewer the facts necessitate a somewhat more moderate view; for example, concerning the importance of intellectual defect in causing crime, and concerning the definiteness with which, by general intelligence tests, we can determine the vocation which an individual should pursue. Further, the author's opinion that ill-paid laborers would not, because of their low intelligence, enjoy any better living conditions than their wages will buy, and that their dissatisfaction is merely the product of the misguided efforts of more intelligent agitators, needs much more evidence to support it than is forthcoming. The book, however, is a clear presentation of one school of investigators of mental ability.

FRANK N. FREEMAN

University of Chicago

EDWARDS, A. S. *The fundamental principles of learning and study.* Baltimore: Warwick and York, 1920. 239 pp.

The first four chapters of this text contain an unsystematic and repetitious discussion of habit and habit formation. They represent the author's view that habit is the

chief mental process in reference to education. The next two chapters give some account of perception and reasoning, and of logical fallacies. Following these are more or less conventional chapters on learning, transfer of training and memory. The next chapter is a collection of illustrations of methods of making an appeal to the student. Included in the remainder of the book are chapters on attention, feeling, physical and physiological conditions, and the supervision of study.

The book is very unsystematic in its general plan and in the execution of the various parts. There are a good many citations of experiments, but the original studies which are referred to are not chosen with a due regard for their relative importance nor are the results of experimental work summed up in a careful and discriminating way. Perhaps the most useful part of the book is to be found in the practical devices which the author suggests. Teachers may find suggestions which will repay reading the book, but they will hardly get a clear or complete notion of the "fundamental principles of learning and study" from it.

FRANK N. FREEMAN

University of Chicago

Fifth yearbook, National Association of Secondary School Principals. Menasha, Wisconsin: George Banta Publishing Company, 1921. 69 pp.

The yearbook contains the directory of members of the association and the proceedings of the meeting at Atlantic City February 28 and March 1, 1921. The papers presented at the meeting are given in full, and the discussions are reported briefly. Those interested in secondary education will find material of value in the volume.

The president's address entitled, "The Submerged Tenth," made an appeal for a sympathetic teacher and an adjusted curriculum for that portion of the student group who were mentally unable to do the regular type of work. It is perhaps best characterized by one sentence taken from the discussion of science. "The standards which prevail elsewhere must be discarded and progress must be determined solely by the ability to move on."

"The Scope of Moral Education in Secondary Schools" was treated under the three queries, *why? what?* and *how?* The speaker's answer to *why* is that ethical character has been recognized as one of the seven objectives of secondary education. Eight traits were designated under *what*, and the *how* was answered by the terms, precept, example, and practice. The paper is inspirational though perhaps necessarily somewhat lacking in specific plans for putting the program into operation.

"Social Problems in the High School" presents the general problem well and correctly insists that the social activity of the school shall prepare for active participation in democratic society and not simply furnish opportunity for individual display or clique snobbery.

The round-table discussion of "Biology as a Requirement for Graduation" brought only supporters to the floor, while a like discussion of "How to Encourage a High Standard of Scholarship" found both advocates and opponents of the honor society as a means to this end. The ideas presented by both sides are worthy of careful consideration. The topic, "The High School Principal's Greatest Problem" revealed diversity of views as to what it is. One considers it to be the balancing of administrative and supervisory activities, while another believes it to be the non-holding power of the school. Helpful suggestions may be found on the first problem.

"Some Possibilities Arising from the Use of Intelligence Tests" reads well but offers little either new or suggestive to those who have been reading even a small proportion of the literature which has appeared in this field in the last three years.

"The Growth of Character Through Participation in Extra-Curriculum Activities" outlines some principles and tendencies and offers some concrete suggestions for the attainment of desired ends.

The resolutions of the association indorsed the following: better trained teachers, better equipped buildings, larger executive and clerical force, modification of the traditional requirements for graduation, election of deans of boys and girls in larger schools, adequate financial support for maintenance of a system of efficient public schools, and a national honor society in high schools. The resolutions condemned giving of expensive awards to individual athletes and the existence of secret societies in secondary schools.

Judging from the yearbook, secondary school principals seeking professional growth will do well to ally themselves with the organization and attend the annual conventions.

ERNEST J. ASHBAUGH

Ohio State University

PITTMAN, MARVIN S. *The value of school supervision*. Baltimore: Warwick and York, 1921. 126 pp.

We have come to feel that all things which have to do with rural education have the amplitude of time immemorial, the placidity of a summer sky, the inertia of a home-bred custom, and the vagueness of an unfenced landscape seen from afar. Such a conception has suffered continuous tremors and sharp spasmodic shocks during the last few years as a result of the activity of a group of rural radicals like Pittman, Foote, Bennett, and others. This book by Pittman will administer such a jolt as will make the formless mass and blurred outlines of rural education fairly quiver.

It is an admirably written autobiography of the adventures of a versatile supervisor in charge, for one year, of a group of rural schools. The book tells in detail just what an energetic, well-trained individual of keen intelligence and adaptable personality can do and did do to improve instruction in the rural schools.

Out of this year's experience came at least three original contributions to the technic of rural supervision. One of these contributions is what Pittman calls the *zone system of supervision*. The system provides for an unusually intensive supervision based upon a knowledge of the specific needs of individual pupils secured from the use of standardized tests.

A second contribution is the idea of a professional journal for pupils as well as teachers. By means of a newspaper to the children Pittman was able to take the pupils into his confidence, enlist their support, and maintain their morale on a high level. Through this medium and with the aid of physical and mental measurements of pupils he was able to define objectively for teachers, pupils, and parents educational goals in the mental and physical realms, and show pupils how rapidly they were progressing toward these goals.

A third contribution involved the careful evaluation of the worth of the supervision given. This is the era of testing, and the obligation rests upon each to prove his worth. A few supervisors have accepted this challenge. Most have not. Pittman's

experimental measurements yielded tangible proofs that he had been worth not less than approximately $50,000 to the community. The experimental measurements brought a tremendous indictment against the inefficiency of conventional rural supervision. If a competent supervisor competently trained can double the efficiency of instruction, there is hope for the future of rural supervision but not much argument for the continuance of conventional methods.

There are certain possible weaknesses in Pittman's study which need mentioning. Although any reader of his book will be struck by the extent to which he made use of standard tests, no intelligence tests were used. Recent progress in the joint use of educational and intelligence tests indicate that a judicious use of intelligence tests would have materially improved his supervision.

In the second place, it could be claimed that a still more adequate series of tests would have shown the supervision to be less effective than it appears. It might be urged that Pittman was able to secure marked progress in the formal, measurable abilities at the expense of less easily measured traits. In so far as he was able to measure these more subtle traits there was no evidence that they had suffered as a result of his supervision. There was, in fact, considerable positive evidence that these traits had been markedly benefited. But he was unable completely to silence such critics.

Finally, it is difficult to determine just how much of the success of the zone system is due to the peculiar skill of Pittman or the novelty of the experiment, and how much to the plan itself when operated by any reasonably competent supervisor for a period of years. All these criticisms of his study are voiced in his book and he confesses that they can be countered only partially by the data which he has collected.

Withal this book is unique and distinctly refreshing. It belongs clearly to the new order of things. Pittman has earned the right to a position in rural education above those who have not put their ideas to the test. The sooner careful scientific work and workers receive this recognition the better it will be for education.

WM. A. McCALL

Teachers College, Columbia University

DONOVAN, JOHN J. and others. *School architecture, principles and practices.* New York: The Macmillan Company, 1921. 724 pp.

A quarter of a century ago a young bricklayer begged Professor Chandler to allow him to become a special student of architecture at the Massachusetts Institute of Technology. In goodness of heart Professor Chandler consented. He saw in the impetuous youth the qualities of leadership, but it is safe to say he did not expect him to become one of the leaders among the schoolhouse architects of America.

Having completed his school days, John J. Donovan went to California as superintendent for Henry Hornbostel and there took charge of the erection of Oakland's city hall. This work was so faithfully and intelligently performed that on its completion he was selected to design and supervise Oakland's school buildings. Only one who has undertaken a task of this kind can realize the lack of scientific data touching this work; yet Mr. Donovan was expected to give exceptional school buildings to Oakland.

Fortunately he was not of the kind to take responsibility lightly.[1] He went about his task with the enthusiasm and thoroughness that insure success. He took counsel

[1] "John J. Donovan has studied school architecture as though his life depended on it," wrote William C. Bruce, Editor of the American School Board Journal

with the best architects. Among them was John Galen Howard; and we shortly find him doing some of the best school work in the country with John Galen Howard associated as advisory architect.

At about the time Mr. Donovan was appointed by the National Education Association as associate on its Committee on Standardization of School House Planning, he had decided to prepare his data on school architecture for the use of his brother architects. He knew that they were finding it difficult to procure such information, but the war came and book publishing was put aside for other duties. However, he could not give up his purpose and during his leisure moments he increased the scope of his proposed book until it grew from a mere handbook to a compendium of schoolhouse design.

John J. Donovan's "School Architecture" is a book with a big purpose. It is a carefully planned and well-executed endeavor to bring before the educational and architectural world the requirements of the school, and the ways in which twenty leaders in the teaching profession would meet these requirements.

It would need many pages to do "School Architecture" justice. Not since the admirable work of Dr. Dressler has a book been published that shows so clearly the advance in school architecture. Many of the articles which had been issued subsequently to Doctor Dressler's book were pamphlets, inadequate, and far from satisfactory, showing little knowledge of the facts or of their relation to each other. Mr. Donovan's book shows many of the best-planned larger school buildings. It is a clear and concise presentation of the demands of the large school. In addition to illustrations in the text it contains one hundred and thirty-three pages of plans and photographs showing noteworthy school buildings which have been built during the past ten years. The wealth of photographic and line cuts drawn to scale are of great value because, in most instances, they are drawings of newly executed school buildings which can be visited by the investigator desiring to learn through first-hand observation.

The first chapter of the book deals with sites and grounds and is followed by a chapter on their planning and development. Then come chapters by Mr. E. Morris Cox on the organization and administration of elementary, intermediate, and high schools. These chapters are of great value because they show to the architect and the school man the correlation between the different departments and the ways in which the school organization should govern the plan.

Mr. Clarence D. Kingsley has given exceptionally valuable information regarding the organization and administration of senior high schools as affecting buildings, Mr. J. C. Knight has written on vocational schools, and Mr. W. F. Ewing has treated the administrative department.

Many of the chapters on the divisions of the school building, such as the class rooms, the school library, the assembly hall, the corridors, stairways, and entrances are written by Mr. Donovan; and these chapters and the chapters on the commercial department, the department for home economics, and the cafeteria are profusely illustrated by plans and photographs showing different arrangements of equipment. The author's personal touch tends to enliven these sections of the book and they radiate some of the energy and enthusiasm which have characterized all of his undertakings.

No book published can be called infallible and there are a few things in "School Architecture" that will undoubtedly be questioned. For instance, some of the suggestions are too expensive to be practical and some are mere fads hardly worth permanent

installation; then again, the chapter on "Heating and Ventilating" shows no understanding of open-air rooms nor any appreciation of their uses and advantages. Most of the chapters, however, present their subjects clearly and without prejudice. The intelligence, interest, and zeal of Mr. Donovan and his collaborators are manifest on every page, and the unassuming and graphic way in which the wealth of information is presented makes the reader continue to scan the pages even after the particular data he desired have been found.

"School Architecture" is a book for the investigator who wishes to study what is being accomplished in the details of school planning by the best men of the architectural profession, the men who are working with the educator to correlate the school building with the work of the school child.

FRANK IRVING COOPER

Boston, Massachusetts

ROBINSON, EMILY AND JOHNSEN, JULIA E. *Vocational education*. New York: The H. W. Wilson Company, 1921. 359 pp.

This book is a compilation of papers, magazine articles, addresses, and excerpts from books dealing with the various phases of vocational education. The first edition was published by Emily Robinson in 1918. This, the second edition, is a revision by Julia E. Johnsen.

There are seventy-seven quotations arranged in eight divisions with the following headings: phases of vocational education for youth, industrial education, trade schools, commercial education, agricultural education, household arts, vocational guidance, supplemental material for second edition. In addition to the eight divisions of quoted matter there is a very extensive bibliography arranged under the following headings: bibliographies, agricultural education, commercial education, household arts in education, industrial education, trade schools, cooperation of agencies for industrial education, vocational education, vocational guidance, vocational surveys, re-education of the disabled.

The bibliography is very complete and is well arranged. It is the kind of bibliography often needed by students and administrators of vocational education and is the most valuable part of the book.

The use of the heading, phases of vocational education for youth, is misleading as all of the material in the section deals with the philosophy or educational basis of vocational education. The quotations are well worth reading by the young student in this field, but it is unfortunate that none of them bears a date more recent than 1916.

In the section on industrial education the articles quoted are of the same general character as those in the first section, and all of them were written before the enactment of the Smith-Hughes Law.

Through an unusual oversight the heading of the section on trade schools is omitted from the table of contents. The section is an excellent collection of material and covers a very wide range of thought in the field. The usual confusion in terminology is in evidence. This is strikingly shown by the inclusion in this section of a discussion of the Gary system.

The sections on commercial education, agricultural education, and household education are unduly brief, and are limited in the range of ground covered. The same may be said of the section on vocational guidance with the added comment that in view of the newness of the subject and the recent developments in this field, the dates borne by the quotations given make them practically worthless.

Aside from the bibliography, the only part of the book which can be of particular interest to readers who are actively engaged in the field of vocational education is the last section which gives several well-selected articles written since 1917.

It is much to be regretted that in the revision much of the older material was not discarded and each section brought up to date. The past four years of experience, dating from the enactment of the Smith-Hughes Law, have caused a very widespread revision of opinion on the problems of vocational education and any book confining itself mainly to generally accepted ideas of five, eight, and twelve years ago as this volume does, must suffer the criticism that it is somewhat out of date.

A book performing the service this book was intended to perform has long been needed.

A. B. MAYS

University of Illinois

KIRKPATRICK, EDWIN A. *Imagination and its place in education.* Boston: Ginn and Company, 1920. 214 pp.

Recent educational literature has tactfully avoided discussions of the nature, value, and training of imagination. This is due in part to the inability of psychologists to agree on what is and what is not imagination. Again, the mental processes known as perception, memory, problem-solving, habit formation, *et ceteras* have so filled the educational psychology of today that imagination has been relegated to a nebulous background. As a result, few parents and teachers have more than a hazy notion of the rôle which imagination plays in the mental development of the child.

This book attempts not only to distinguish imagination from other forms of mental activity, but also to determine something of the part it should play in the educational program. The author discusses "the varieties of imaginative activity in the adjustments of daily life, the changes in the content and form of imagination that occur in the course of a child's development, individual differences in the prominence, intensity, and quality of imagination, and the proper utilization of this activity in the work of the school."

Professor Kirkpatrick's book is the outgrowth of the results of tests given his students in the field of imagination as well as the reports of their introspective studies. No mental activity is more individualistic and less tangible than the imagination, and any attempt to collect data in this field in a scientific fashion should be given due consideration.

The concrete illustrations and examples of imagination which the author presents to support his views serve to make the book more accessible to the lay reader. The language is devoid of technical terminology since the book is intended primarily for use in teachers' reading circles.

The third part, which deals with "School Subjects and the Imagination," seems to be a rehashing of much of the material found in our special-methods texts, clothed in terms to fit the subject at hand. Educators interested in the movement for visual education would do well to read what Professor Kirkpatrick has to say on the value of pictures, moving and still, in training the imagination.

The exercises which occur at the end of most of the chapters are for the most part intended for individual or group study. A few of them point to interesting experiments which a study circle could carry forward. A comprehensive bibliography adds to the usefulness of the volume.

DEAN MCCLUSKY

University of Illinois

EDMAN, IRWIN. *Human traits and their social significance.* Boston: Houghton Mifflin Company, 1920. 467 pp.

While this is not primarily a book dealing with educational problems, much of its content is identical with subject-matter essential to courses in educational psychology and the philosophy of education. The book was written, the author informs the reader, "originally and primarily, for use in a course entitled 'Introduction to Contemporary Civilization' required of all freshmen in Columbia College." This title might be misleading, for there is no portrayal, as might be expected, of modern institutions and customs, but rather a description of the needs and impulses which give rise to the products and achievements of civilization. The subtitles of the two unequal parts into which the book is divided are somewhat more aptly indicative of the contents.

The first and by far the larger part bears the title, Social Psychology. It comprises eleven admirable chapters dealing chiefly with the essentially and persistently, though greatly modifiable, instinctive nature of man, with special reference to man's social impulses; the birth, significance, and limitations of reflection; the demand for privacy and individuality; the development of the self; individual differences, including sex differences and a discussion of the factors of heredity and environment; a brief history of language and its twofold function of expressing ideas and conveying emotion; and finally, the racial and cultural continuity.

This part presents a masterly survey of the substantial results of the scholarly work of the following authorities: James, McDougall, Thorndike, Dewey, Woodworth, and Trotter. The author avoids controversial matters and technical discussion, being particularly interested to give the student and general reader an easily assimilable, yet thorough, working knowledge "of the fundamentals of human nature and a sense of the possibilities and limits these give to human enterprise." In this the book should be highly successful, for here, as well as in the second part, the treatment savors not in the least of the "textbook" style. It is clear; fresh (even in the discussion of basic instincts); rich with illustrations drawn from the world the student lives in; interspersed with epigrammatic statements, striking and easily retained, which sum up previous discussions; and illumined with a wide variety of well-chosen and rather uncommonly extended quotations which cannot but lead the more reflective reader directly to these sources. The book is written, it can easily be seen, for the student, and even what might occasionally be regarded as redundancy has, one feels, a pedagogical purpose.

The second part, entitled "The Career of Reason," is as well written as the first. The author states that it has been used with success in introductory philosophy courses. The interesting feature here is that the vast fields of religion, art, morals, and science, each receiving an extended chapter, are surveyed from the standpoint of their human value. Reason is, of course, taken in the broadest possible sense as the power by which mankind makes itself at home in the world and wins happiness. The author announces his naturalistic viewpoint, acknowledging chief indebtedness to James, Dewey, and Santayana, whose influence does indeed dominate the discussion.

Religion, art, morals, and science are shown to be partial fulfilments of human needs and longings. "Religion arose as one of the earliest ways by which man attempted to win for himself a secure place in the cosmic order." "While man lives and wonders, hopes and fears, feels the clear beauty, the infinite mystery, and the eternal significance of things, the religious experience will remain, and men will find objects

worthy of their worship." "Science is man's persistent attempt to discover the nature of things, and to exploit that discovery for his own good." "Having in his needful business fortuitously created beautiful objects, man comes to create them intentionally, both for their own sake and for the sheer pleasure of creation." "In the enterprise of Morals, man attempts to discover how to control his own nature in the attainment of happiness." It would be difficult to find many books which present in a more thorough, sympathetic, and fascinating way the human significance of these important phases in the "Career of Reason."

There are minor points, most of them matters of arrangement, which attract critical attention. One wonders, for instance, why, in the excellent chapter on what place science has in the economy of human happiness, there is no mention of the feeling, wide-spread in modern literature, that science has perhaps taken more than it has given in that it has revealed a universe, not friendly and spontaneously providing, but one blind and indifferent to human wants and ideals. In another context, in the chapter on religion, this does find a place, and the author himself says (p. 316): "Nature is thoroughly impersonal, and indeed, were it to be judged by personal human standards, it could with more accuracy be maintained that it is evil than that it is good."

Then again, in the chapter on morals, one misses a reference to what is indeed treated to some extent in the first part of the book, but which cannot be omitted in even a brief treatment of Ethics, since it is probably the fore-most present-day problem in ethical theory, namely, how can group unity be achieved while granting individual freedom?

Very conspicuous, because of the author's usual fairness and carefulness, is his apparent identification of conscience with "instinctive caprice" (p. 451). It is in contradiction to a more tenable statement made on the same page, that "Conscience is thus reduced to habitual emotional reactions produced by the contact of a given individual temperament with a given environment." Yet even this is not the only defensible view to be taken of conscience, as may be seen (p. 433) from a quotation from Dewey and Tufts used by the author himself: "The duty of some exercise of discriminating intelligence as to existing customs, for the sake of improvement and progress, is thus a mark of reflective morality of the régime of conscience as over against custom."

But these are, after all, minor considerations, in a book which in its stimulation and interest should prove an example to writers of students' texts, and which in its scope and sweep and organization should be extremely valuable in giving the student and general reader a broad and unified view of what modern scholarship holds man is and what he may become.

C. Krusé

University of Illinois

Peaks, Archibald G. *Periodic variations in efficiency.* (Educational Psychology Monographs, No. 23.) Baltimore: Warwick and York, 1921. 95 pp.

Variations in muscle strength as recorded by dynamometric tests and in primary memory as shown by the reproduction of a number of digits are investigated in this report. The study was made during the school year 1910–1911 at the Manual Training High School of Washington University, St. Louis, Missouri. The data were secured from ten students tested on each school day and from twenty-two students tested once a week. At each testing each subject was given three trials with the Smedley Dynamom-

ter. On each day the highest score was taken as the record. In connection with each testing the date, the time of day, the general character of the day, and the temperature were recorded.

The facts which seem to be indicated by this investigation are as follows:

1. There are three distinct periods of physical and mental growth during the school year, a period of depression from January to March and two periods of favorable growth from September to December, and from March to June.

2. The mental depression seems to occur later than the physical depression, is not as noticeable, and does not last as long.

3. Mental and physical abilities are favorably affected by sun light, and the stronger its rays, the greater its influence.

4. The lowest and highest temperatures have a depressing effect.

5. No day of the week seems to be especially favorable.

6. Both mental and physical efficiency increase rapidly during the morning with a slight decrease around noon. Mental efficiency reaches maximum about 2 P. M., and physical efficiency a little later.

7. Cloudy days if not too long continued are usually more favorable to both mental and physical efficiency than clear days.

This investigation has been conducted away from the artificial conditions of the psychological laboratory and carried into the actual school environment. The author might have gone one step further and used actual school tasks in place of the artificial reproduction of isolated digits. The number of pupils tested is doubtless too small to give great weight to the conclusions. The investigation, however, shows the possibility of measuring periodicity under controlled conditions in the actual classroom.

P. R. STEVENSON

Ohio State University

News Items and Communications

Why H. S. Graduates go to College

This is the problem which W. P. Morgan, president of the Western Illinois State Teachers College at Macomb, is trying to answer. Last June he sent a comprehensive questionnaire to high-school seniors all over the United States. We can readily see how the answers to this questionnaire, which are now being tabulated, will be useful in educational and vocational guidance.

Self-Analysis at Ottumwa

"When you conduct a recitation," asks Superintendent Blackmar of Ottumwa, Iowa, of his teachers, "do you assign the lesson accurately and definitely; do you always call for a report on special topics; do you have in mind some definite purposes?" These and a number of other questions constitute a suggestive sheet which Superintendent Blackmar's teachers receive. He also lists "Some Marks of a Successful Teacher," and "Some Causes of Failure." We should think that the self-analysis which this material suggests would be exceedingly helpful to the schools of Ottumwa.

Bulletins from West Virginia

Consolidation of Schools: Advantages, Cost, Objections is the title of one of the new bulletins which we have recently received from West Virginia. It was prepared by R. I. Roudebush, State Supervisor of Rural Schools. For its size—only seven pages—it presents more forcibly and more concisely the school consolidation problem than any bulletin which we have lately seen. The "before and after taking consolidation medicine" is well illustrated with clear photographs, tables, and graphic representations. Another bulletin, *A Catechism on Vocational Education in West Virginia under the Smith-Hughes Law* prepared by J. F. Marsh, state director, is well worth studying by all who are interested in Smith-Hughes work. For copies of both these bulletins address George M. Ford, State Superintendent of Free Schools, Charleston, West Virginia.

A Difference Method

Professor L. W. Cole of Boulder, Colorado, is using what he calls "the mental difference" in the examination of paired groups of children. In a recent letter he gives an illustration of the use of this method as applied to a superior and to an inferior division of the first grade. The scores referred to in the accompanying table represent the achievements of the pupils in the Cole-Vincent tests. These tests may be obtained from the Bureau of Educational Measurements and Standards, University of Colorado, Boulder, Colorado. The table illustrating Professor Cole's difference method follows.

	Score	Mental Age	Chronological Age
Superior Division....	31.8	7–1	6–7.6
Inferior Division....	15.2	5–10	6–2.4
Difference.....	16.6	1–3	0–5.2

Mental Difference (M. A.—C. A.), 9.8 months.

Value of Handwriting Scales

President S. E. Davis of the State Normal School at Dillon, Montana, raises a question concerning the value of some of our scales and measurements. This question was brought more forcibly to his mind after reading Professor N. A. Harvey's *The Psychology of the Common School Subjects* wherein the author states that after very thorough testing he has been unable to determine that any writing scale has effect in steadying the markings of the graders.

We have certainly seen evidence on the other side of this question; but evidently the matter is not thoroughly settled. We should be glad to have our readers submit evidence on either side. Mr. Davis states that he has used writing scales in handling thousands of papers and that he took for granted that there was a steadying effect. Less extensively he has used the Willing Composition Scale and other composition scales and in their use he also took for granted that the steadying element was present. Mr. Davis believes that the solution of this question might be worth an extended study. "Nothing less," he concludes, "would have any serious value." We agree with him.

Predicting Teaching Success

Mental tests are being more and more widely used. Of that everyone is aware. There is a feeling, however, that in addition to native intelligence there are other qualities having to do with emotional and volitional traits which enter so largely into the success of human efforts that an inventory of these qualities should be provided. An example of this is found at the Edinboro State Normal School where Professor L. H. Van Houten, director of the Extension Department, is about to make a survey of the students both by means of the Thorndike intelligence tests and by means of the Downey Will-Profile Tests. Professor Van Houten adds in this connection, "I am particularly interested in the latter because of some possible value there may be in it for determining the personal qualifications, which make for a successful teacher."

If we can secure an instrument of measurement to be used with students in Teacher-Training institutions—an instrument which will enable us to predict their probable ultimate success as teachers—we are sure that such an instrument will be of a degree of importance which it is impossible to exaggerate. We are likewise sure that general intelligence, while it forms an unquestionably large part in the general equipment required for success in teaching, is by no means all there is to the question. We believe that Professor Van Houten is moving in the right direction.

A Study of Class-Size in Chicago

A study of the relationship between class-size and the efficiency of instruction based on controlled experiments was begun at Chicago last fall by Mr. P. R. Stevenson under the direction of Dr. B. R. Buckingham and with the active cooperation of Mr. Ambrose G. Wight, assistant superintendent in charge of measurement for the Chicago Public Schools. Classes from eight elementary and four high schools were used.

In the elementary schools the relative gains in achievement of the large and small classes were measured by standardized tests. These tests were given near the beginning of the first semester, at the end of the first semester, and near the end of the second semester. To eliminate other causes than that of class-size as affecting the efficiency of instruction the following procedure was used: (1) each class was made large (45 pupils or more) one semester and small (35 pupils or less) the other semester; (2) the same teacher taught the same group of children both semesters (except where pupils were added to or taken away to make the class larger or smaller); (3) all pupils were promoted at the end of the first semester; and (4) intelligence tests were given to all pupils in these classes so that when the number of pupils was increased or decreased, the intelligence level of the class could be kept constant.

High-school classes were selected where a teacher could teach two or more sections of the same subject. Intelligence tests were given to the students, who were then divided into large (30 students or more) and small (25 students or less) sections. These sections were approximately equal in intelligence and variability. By this procedure it was possible to have two or more sections each equal in intelligence, and taught the same subject by the same teacher. At the end of the semester each teacher gave the same examination to her sections. The term grade for each pupil was also secured.

It is planned to publish a report of this study in a bulletin of the Bureau of Educational Research, University of Illinois.

P. R. STEVENSON

Ohio State University

Research Concerning Civic Education

The Institute of Educational Research has under consideration a study of civic education. Precedent, however, to any precise study, we are taking up two questions: (a) what have been the contributions to such a study by educators, and (b) what is connoted by the term?

There is abundant material at hand. If we go no further back than the report of the subcommittee of the N. E. A. Committee of Ten and confine ourselves to our own country, a very definite extension is observable which involves not merely the rearrangement in emphasis of studies, but as in the project method of elementary schools, even a new conception of what a curriculum should really mean. The citizen conception has so far outrun the governmental relation that training for citizenship is neither a subject nor an activity so much as a conditioning of the goal of educational effort. Even in secondary schools there are new emphases on social subjects and a new time distribution which may tend to crowd out some more venerable figures of the curricular gallery.

This extension, however, had dimmed certain old boundaries. The scope of civics may be determined by the relations to government, but as so many factors other than political are involved in the creation of new governmental commissions and other bodies, and so many new functions are being initiated, it will be desirable, I think, to determine what the limitations really are as distinguished from those of sociology, economics, etc., not so much in terms of formal definition as in an organization of material.

Aside from subject matter is the other aspect of a curriculum in the broad sense—the rapidly developing forms of societies and organizations involving pupil activities and government, the visits and excursions, the outside organizations, and the cooperation of school authorities therewith—all as they operate consciously for civic training. A tabulation of such activities—place, character, etc. is a good thing and has already been well done for one section. We are considering a more careful analysis of some of them in detail as they illustrate certain possibilities for extension.

One definite piece of research we have undertaken. There is considerable waste effort in teaching the foreign-born, because of failure of civic instruction with reference to those particular phases of past experience that hinder adjustment. Races, nations, and provinces have each of them certain conceptions, attitudes, and habits that do not serve in American life, and these must be considered. Others can be built upon in the program for civic training. What the particular conceptions, habits, ideals, or attitudes are, we shall undertake to discover. Adopting a provisional list of headings: racial origin, racial customs and characteristics, occupational factors as determining civic and social attitudes, political points of view, educational opportunities, relation to other races. We are building up from a selected bibliography a series of descriptions under each head. The descriptions and bibliographies will be submitted to leaders among the foreign-born and to students for comment, revision, and criticism. Possibly the headings will be changed and the bibliographies enlarged.

ALBERT SHIELS

Teachers College,
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Cost of Supervision

Assistant Superintendent Charles D. Dawson of Grand Rapids, Michigan, has lately made a study of the cost per pupil for supervision and of the subjects supervised in 39 cities ranging in population from 50,000 to 250,000. The data are for 1920–1921. They were obtained from reports of conditions in September 1921.

In his report, a mimeographed copy of which has lately been received, Superintendent Dawson shows two important tables. The first concerns the cost of supervision and the second indicates the subject in which supervision is provided in the 39 cities.

After commenting in connection with the first of these tables on the fact that the cities differ widely in population and in the number of pupils on register at the end of the school year, Superintendent Dawson says: "A casual observation shows also that the cost per pupil for supervision varies considerably. Wheeling, West Virginia spends $1.60 per pupil while Scranton, Pennsylvania spends but $0.65. Holyoke, Massachusetts spends $3.52 and San Antonio, Texas $0.69. Davenport, Iowa spends $2.89 while Nashville, Tennessee spends $0.70. By noting the school populations of these cities we observe that the three cities, with high per pupil cost, are small; while the cities with low per pupil cost are large. The question arises at once: Does it follow that the larger the school population, the smaller the cost per pupil for supervision? By figuring the correlation (Spearman's rank method) between the number of pupils belonging at the close of school and the cost per pupil for supervision we find this correlation to be −0.77. That is to say, it is true, in the main in this study, that schools having a large number of pupils have low cost per capita for supervision. From these 39 typical schools it would seem that we are justified in concluding that in general the greater the school attendance the lower the cost per pupil for supervision."

The author of this report finds that so far as Grand Rapids is concerned it ranks tenth from the *highest* in number of pupils, but that instead of ranking tenth from the *lowest* (rank 29), Grand Rapids ranks eighteenth. In other words, the cost per pupil for supervision is somewhat high in Grand Rapids.

He points out, however, that this takes no account of the results of supervision and goes on to show the remarkable development of supervision and the satisfactory results obtained from it at Grand Rapids.

In connection with Table II of the report, Superintendent Dawson finds that on city has *special* supervisors for all the subjects listed in the table. The subject most universally supervised by special supervisors is music, all cities but one having a special supervisor of this subject. Also it appears from the table that high-school subjects are least supervised by special supervisors. This is only apparently true, since it is often the custom for superintendents in these cities to reserve the general supervision of high schools for themselves and to assign the special supervision of subjects to heads of departments, who thus become in reality supervisors of special subjects.

In conclusion Superintendent Dawson recognizes the many varying factors which may enter into this question of expenditures for supervision and points out for Grand Rapids that in order to give that city the rank of tenth from the lowest, which a perfect correlation between the pupil population and cost of supervision would imply, there would need to be a cut of from $3,500 to $4,500 in the total amount spent for supervision. In this connection, however, he says:

"In view of the fact, however, that the above amount is so small, and also because the results in subjects supervised are first class, it would seem inadvisable to curtail the work of these departments by cutting the supervisory budget this small amount."

Educational Survey of a Supervisory District in New Hampshire

Mr. S. S. Brooks, whose articles on the use of tests in rural schools are appearing in our Journal, has recently become superintendent of the supervisory union of Winchester, Hinsdale, Swanzey, and Richmond, New Hampshire. Profiting by the experience which he gained while at Silver Lake, he has started a survey of this new district.

"During the past two weeks," Mr. Brooks writes, "I have given the National Intelligence Tests or the Kingsbury Group Intelligence Tests to nearly eight hundred school children. I have given the tests, scored them and recorded the results in form for filing besides doing the regular routine work of the district which consists of three small but wealthy manufacturing towns in the southwestern corner of New Hampshire. There are about fifteen hundred school children in the district and sixty regular teachers including those of the two high schools.

Achievement tests in reading, arithmetic, writing, spelling, language, and geography have been given in all the schools and the results are now being transferred to the graph cards. Results so far indicate that the children will average rather low mentally, somewhere between 80 and 90 I. Q. There is a large foreign element here, mostly Poles and Lithuanians. The children generally are up to grade or above in arithmetic but much below in reading, language, and the content subjects. This tends to confirm the opinion formed as a result of using tests in the other district, namely, that arithmetic is overemphasized in most schools at the expense of the other subjects because it is easy to teach and because the children like it. Much time is wasted in drilling on the fundamental operations after the children are already above standards.

"This preliminary survey will furnish the teachers and myself with a starting point for the year's work and enable us to measure the progress of pupils and the effects of remedial measures to be introduced as a result of conditions found to exist. In all grades intensive silent-reading class drill covering a wide variety of subjects will form the main feature of this year's effort to improve conditions. The reading drill will be supplemented by a definite campaign of vocabulary building."

S. S. Brooks

Superintendent, Supervisory Union,
No. 25, Winchester, N. H.

Incommensurability of Alpha and Beta

For the Army mental testing program there developed two group intelligence tests, Alpha for those who could easily read and write, and Beta for those who could not. About one-quarter of the recruits took Beta. The other three-quarters took Alpha. Each test gave ratings in terms of A, B, C+, C, C−, D, and D−. In practically every company there were men for each test. When the company commander selected his men for various duties on the basis of these ratings, he, of course, assumed that a rating of, say, B in Beta was the same as B in Alpha. When the problem of the

distribution of intelligence ratings according to nativity was studied[1] it was obviously assumed that the letter ratings by Alpha and Beta were commensurate, for apparently these ratings by the two tests were combined in making up the graphic comparisons.

This problem was studied in the fall of 1918 at Camp A. A. Humphrey where the writer was a member of the psychological board. Of the 1,794 enlisted men who took both Alpha and Beta it was found that only 37 percent received the same letter ratings in these two tests. Of 195 men earning A in Alpha, 34 percent got B in Beta, 22 percent C plus, 5 percent C, and only 8 percent C minus. In other words 69 out of a hundred regular Alpha men who earned a rating of A in Alpha would have lost from one to four points, in terms of letter ratings, by taking Beta instead. On the other hand, it was found that of 228 D minus men in Alpha 50 percent got D in Beta, 15 percent C—, 4 percent C, and 1 percent C plus. Therefore 68 percent of those who earned the lowest rating in Alpha would have been from one to four letter grades better off by taking Beta instead. The men scoring high in Alpha would be penalized by substituting Beta, whereas those scoring low in Beta would be rewarded by substituting Alpha. One thing is certain, the two scales are not nearly commensurate.

This discrepancy between the ratings by the two scales presents some very obvious difficulties when problems are studied in the light of the ratings by the Army tests. The writer experienced such difficulties in a study for the War Department of "The intelligence of troops infected with hookworm versus those not infected," being a study of 13,278 cases, which appeared in *Pedagogical Seminary*, October, 1920. In spite of the fact that the statistical experts of the office of the Surgeon General of the Army devised a scheme for reducing Alpha and Beta ratings to a common denominator, this attempt at reduction never proved accurate. The Alpha ratings will always be Alpha ratings, and nothing more.

What an advantage it would have been for practical as well as for scientific purposes if the almost two million intelligence ratings on file in the War Department had been in terms of one continuous scale whose ratings would have had a constant meaning! As a matter of fact a number of men of the Psychological Service were striving in that direction at the time of the signing of the Armistice.

Copying after the Army program, the test makers soon developed group intelligence tests for the public schools, which like Alpha, demanded ability to read and write English rather freely. Hence the earliest of such tests applied only to the upper grades and high school. Soon there came the obvious demand for group tests for the lower grades. Consequently there have developed tests that apply to the lower grades only and other tests for the upper grades only. Moreover, there have been subdivisions, so that there are now tests that apply only to one or two grades.

When the research man wants to use the ratings by intelligence tests to study large school problems involving the intelligence ratings of the children of all grades and ages of a given school system, the same difficulty arises which arises when research is attempted with ratings by the two Army group tests.

Moreover, the same problem which confronted the practical Army man confronts the practical school man. How can he interpret the ratings by one scale in terms of the ratings by another scale? How can he study the ratings of his first, second, third, or fourth grade in comparison with the ratings of his higher grades or high school?

[1] See *Memoirs of the National Academy of Sciences*, 15: 696-98.

From experience with regular school tests and standardized educational measurements, this practical school man has observed that there is a tremendous overlapping, that some children, for example, in grade II do as well in a test as others in grade v. But if the measuring device for grade II does not apply to grade v, how can any one compare the two ratings or compute the amount of overlapping? No one can with accuracy. Of course like the Army statisticians, some test makers have devised schemes for reducing the ratings of their several scales to common units of mental age or to some other units. But no scheme has succeeded in making ratings by any two such scales commensurate and doubtless no such scheme can be found.

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The Classical Investigation

A comprehensive survey of the results secured in the teaching of Latin has been undertaken by the American Classical League with the financial support of the General Education Board. The committee intrusted with the conduct of the survey has published a preliminary report which outlines the plan of the investigation.[1] The report is tentative only and the procedure suggested will doubtless be modified in many particulars as the investigation develops.

The problem to which the committee is primarily addressing itself is to determine the content and method by which the aims commonly ascribed to the study of Latin may be most effectively attained and, as the complement of this, to estimate the relative importance to be attached to these aims in constructing a course in Latin for the secondary schools. In forming such an estimate various criteria may be considered such as their relative attainability through Latin, the relative likelihood of their entering into the life-experience of the pupil, and the relative importance of their contribution to the general objectives of secondary education.

By this process it is hoped that a sound factual foundation will have been laid for the discussion and solution of the still more fundamental question as to the place and value of Latin in the curriculum as a whole.

In order to provide an adequate basis for any desirable reorganization of the content and methods of the present Latin course, and in order to make it a more effective and serviceable educational instrument, the committee is planning to inaugurate a comprehensive testing program of sufficient scope both in variety and in geographical distribution to enable it to determine, first, to what extent under present conditions the objectives commonly claimed for Latin are attained and, second, what content and what methods provide the conditions most favorable for their attainment.

The shortness of time available will not permit the committee to await in all cases the results of the general survey before attempting to provide remedial measures. It is a reasonable presumption that the needs for improvement disclosed will be plentiful. Consequently the committee is seeking in connection with every test given in the general survey to institute contemporaneously a controlled experiment in a limited territory in which methods may be tested, results measured, and constructive recommendations proposed. Should the results of the general survey when they are

[1] The report is in three sections. Section A and Section B appeared in the October number of the *Classical Journal*. Section C will appear in the December number.

afterwards obtained prove to be so satisfactory as to render such studies dispensable, the loss will in such cases be cheerfully borne.

Furthermore, wherever the committee is convinced that results could be more adequately secured in certain fields if pertinent data were more carefully analyzed and organized, immediate steps are being taken to provide these data. This applies especially to many of the objectives involving the application of knowledge gained in Latin to other subjects.

In attempting to determine by means of tests whether Latin is performing satisfactorily the various functions it is claimed to perform, the committee was naturally confronted by the absence of any absolute standards of attainment in the various abilities concerned; and, hence, it has been compelled to adopt the comparative method at every stage possible. That is, it proposes to measure the *relative rates of progress* made by pupils who are beginning the study of Latin and by non-Latin pupils of the same grade. It proposes by means of initial equating tests in each special ability tested, supplemented wherever possible by general intelligence tests, to determine what initial superiority, if any, Latin pupils possess and to measure on that basis the relative progress of the two groups.

It is planned to measure these same pupils at intervals during the next two years. The final analysis will, whenever possible, be made upon the basis of those Latin and non-Latin pupils who remain at the end of two years and who can be paired on the basis of their initial scores.

This testing program is ambitious, and can be carried out even partially only through the generous cooperation of departments of research in both universities and municipalities. If the response called forth by the announcement of the first series of tests is a fair criterion, the committee is justified in feeling that a reasonable portion of the program may be carried through. Its plan as presented in the preliminary report is exhaustive for the very purpose of providing as many points of contact and as many fields of common interest and cooperation as possible.

The committee proposes to go wherever the facts lead. No part of the present course is sacred to it. It is a fair statement to say that it is proposed to re-appraise the entire content of the present course in the light of the facts disclosed. The present reading course in Caesar, Cicero, and Vergil may pass the test unscathed, but it will require more than tradition to preserve it. The whole question of the content of the course is to be opened afresh and without prejudice.

The committee is proposing, in other words, to find the facts; and if the investigation results in the exposure of unsightly family skeletons, it does not intend to hesitate on that account. It will be borne in mind, however, that the committee's purpose in exposing any skeletons is to remove them. If the first half of the program is carried out with absolute sincerity, any apparently unsatisfactory disclosures will be but a guarantee that the second half of the program will be prosecuted with equal thoroughness.

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National Association of Directors of Educational Research

(E. J. Ashbaugh, *Secretary and Editor*)

President Rugg recently met with the representatives of the organizations which have been invited by the Department of Superintendence to meet with them at Chicago this winter. He reports that the officers of the department welcomed his suggestion for a three-session program of our association this year. In consequence he has already started to secure the best possible talent for these meetings. In spite of the high standard set in the past, we believe it is safe to predict that those interested in the research programs which will occur on Tuesday, Wednesday, and Thursday afternoons will find that the program has not only been lengthened but also enriched. For the meetings we have been granted the largest room available in any of the hotels. Further announcements will be made from time to time.

Boston.—Dr. Arthur W. Kallom, assistant director of the Department of Educational Investigation and Measurement, reports that the problem of cost in connection with testing has become a real one at Boston. In order that the department may cooperate with the schools to a greater extent the masters (principals) will be required to buy their own tests and test materials. The problem of retardation is being investigated. He says: "The statistics collected in Boston on this matter have not been at all satisfactory, largely because the question of age has been left to the teacher. How far we shall be able to go into the matter, I am not yet certain; but I hope it will be possible to carry the study through to completion." Kallom is also organizing a course in the measurement of intelligence for a group of kindergarten teachers which he believes is going to be both interesting and helpful.

State University of Iowa.—Dr. H. A. Greene, who succeeds Dr. E. J. Ashbaugh in directing Educational Service at the State University of Iowa, outlines the following problems for the coming year. First, they are engaged in a state-wide cooperative survey of arithmetical abilities to serve as a recheck on the survey of arithmetic made in 1915 by Dr. Ashbaugh. The remaining three projects are concerned with silent reading, namely: (1) a state-wide study of silent-reading abilities in the state on a cooperative basis; (2) experimentation with the possibilities of devices for the measurement of comprehension in silent reading; (3) the development of at least two types of silent-reading tests, one for use as a group test in primary grades and the other for use in the upper elementary-school grades.

University of Michigan.—Dr. Clifford Woody, the new director of the Bureau of Mental Tests and Measurements, informs us that 38 public school systems of Michigan are participating in a cooperative testing program launched by the bureau. The

testing programs called for the giving of the following tests during the second and third weeks of October:

National Intelligence Tests, Scales A and B.

Monroe Silent Reading Tests, Form 3, Revised Edition.

Courtis Supervisory Tests in Arithmetic, Forms A and B.

Buckingham's Extension of the Ayres' Spelling Scale (selected words).

In order to connect the achievement tests more closely with the improvement of class instruction, extended questionnaires concerning teaching practices in the various subjects were filled out by the teachers on the days when the tests were given.

When the data for the individual schools have been compiled, they will be forwarded to the Bureau where comparative records will be assembled and state standards determined.

Iowa State Teachers College.—Professor Fred D. Cram has furnished us with an interesting report on a bit of research work he conducted last spring. He calls it "A Tentative Study of the Content of Children's Minds in Respect to Names of People in History." Eighth-grade children were given two minutes in which to write the names of people who have been great in American history. Data were secured from 1,149 children in twenty-three schools. The study was undertaken to ascertain how adequately the subject of American History is being taught and what names are impressed upon the children before they leave the elementary schools.

Two hundred and thirty-two names were mentioned of which thirteen were women. It is interesting to note that Washington and Lincoln were the only names mentioned by more than 50 percent of the children, they being listed by 93 and 87 percent respectively. Seven others, Grant, Jefferson, John Adams, Roosevelt, Robert E. Lee, Columbus, and Jackson were mentioned by more than 25 and less than 50 percent of the children. Of the names of women, two only, Harriet Beecher Stowe and Betsey Ross, were mentioned by more than 10 percent of the children.

The report is exceedingly interesting but is not specific as to the modification of our history work which should be made if this survey reports a truly typical situation.

West Allis, Wisconsin.—Mr. T. L. Torgerson, director of the Department of Educational Measurements, has furnished us with his Bulletin No. 2 on Tests and Measurements—a bulletin sent by the department to the teachers and persons directly interested in the local situation. The report will be briefed in the next issue of the JOURNAL.

Long Beach, California.—Mr. Ernest P. Branson has favored us with a mimeographed copy of what he calls a Research Primer by the Research Committee of the Long Beach High School. Ten questions are propounded and carefully answered. The questions are as follows: (1) What is intelligence? (2) What is an intelligence test? (3) Of what use is such a test? (4) Of what value is the scheme of having X and Z divisions. (These letters evidently refer to groups of children selected on the basis of intelligence.) (6) What has already been accomplished in the Long Beach High School by the use of the Terman Group Intelligence Tests? (7) Can the same work be given to X and Z sections? (8) Should a Z division enroll as many pupils as

an X division? (9) How should pupils who have been placed in the wrong section be adjusted? (10) Who are members of the Research Committee and what can the faculty contribute to the committee? The idea seems to be a good one for educating the entire teacher group and for informing it as to the activities of the committee.

Grand Rapids, Michigan.—Charles D. Dawson, assistant superintendent in charge of research, has sent in three bulletins. One is a bulletin to the principals, giving report on Monroe's Diagnostic Test on Fundamentals of Arithmetic, given last June. The one thing in the report of perhaps greatest value to our readers is his slogan "Every school up to standard, every grade up to standard, and every pupil up to standard in the fundamentals of arithmetic by 1925." The second is the annual report on the educational status of 35 schools of Grand Rapids as shown by standardized educational results. The report shows splendid progress over the preceding year in each test which was repeated. Mr. Dawson and his co-workers should be congratulated on securing this attainment. The third bulletin deals with a study of the cost per pupil for supervision and of the subject supervised in 39 cities ranging in population from fifty thousand to two hundred and fifty thousand. A brief report of this study will be found under *Communications*.

A REQUEST FOR REPORTS ON CIVIC EDUCATION

The Institute of Educational Research, Division of Field Studies of Teachers College, Columbia University requests from Superintendents, Principals and Teachers:

1. Copies of reports, studies or proceedings of committees of schools or educational associations, local, state, or national, on *CIVIC EDUCATION* or related subject matter.

2. Descriptions and reports on experiments in the organization or administration of schools, or in pupil activities and projects or extra mural activities carried on under school direction or in cooperation therewith.

This request is made in the interest of an analysis of present conditions and tendencies, and of new developments in the field of civic education.

Copies of such reports should be addressed to:

INSTITUTE OF EDUCATIONAL RESEARCH,
Division of Field Studies (Civic Education),
Teachers College, Columbia University,
NEW YORK CITY, NEW YORK.